# **INSTALLATION RESTORATION PROGRAM**

# PHASE II CONFIRMATION/QUANTIFICATION STAGE 1

REESE AIR FORCE BASE LUBBOCK, TEXAS

Prepared by:

ECOLOGY AND ENVIRONMENT, INC.
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**April 1988** 

FINAL REPORT (May 1986 to April 1988)

**VOLUME II: APPENDICES** 

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## Prepared for:

UNITED STATES AIR FORCE
Headquarters Air Training Command
Bioenvironmental Engineering
HQ ATC/SGPB
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UNITED STATES AIR FORCE
Occupational and Environmental Health Laboratory
(USAFOEHL)
Technical Services Division (TS)
Brooks Air Force Base, Texas 78235-5501



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# INSTALLATION RESTORATION PROGRAM. PHASE II. CONFIRMATION/QUANTIFICATION STAGE 1

FINAL REPORT
FOR
REESE AIR FORCE BASE
LUBBOCK, TEXAS

UNITED STATES AIR FORCE
HEADQUARTERS AIR TRAINING COMMAND
BIOENVIRONMENTAL ENGINEERING
(HQ ATC/SGPB)
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APPENDIX A

GLOSSARY OF TERMS

AAF: Army Air Field

ABG: Air Base Group

ACFT MAINT: Aircraft Maintenance.

AF: Air Force.

AFB: Air Force Base.

AFESC: Air Force Engineering and Services Center.

AFFF: Aqueous Film Forming Foam.

AFR: Air Force Regulation.

ALLUVIUM: Materials eroded, transported and deposited by streams.

ALLUVIAL FAN: A fan-shaped deposit formed by a stream either where it issues from a narrow mountain valley into a plain or broad valley, or where a tributary stream joins a main stream.

ANTICLINE: A fold in which layered strata are inclined down and away from the axes.

AQUAZENE: An algicide.

ARTESIAN: Groundwater contained under hydrostatic pressure.

AQUIFER: A geologic formation, group of formations, or part of a formation that is capable of yielding water to a well or spring.

AROMATIC: Description of organic chemical compounds in which the carbon atoms are arranged into a ring with special electron stability associated. Aromatic compounds are often more reactive than non-aromatics.

ATC: Air Training Command.

AVGAS: Aviation Gasoline.

BEE: Bioenvironmental Engineer.

BES: Bioenvironmental Engineering Services

BIOACCUMULATE: Tendency of elements or compounds to accumulate or build up in the tissues of living organisms when they are exposed to these elements in their environments, e.g., heavy metals.

BIODEGRADABLE: The characteristics of a substance to be broken down from complex to simple compounds by microorganisms.

BX: Base Exchange.

CALICHE: A secondary accumulation of opaque, reddish brown to white calcareous material occurring in layers near the surface of stony soils in the arid and semi-arid regions of southwestern United States.

CE: Civil Engineering.

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act.

CES: Civil Engineering Squadron.

CIRCA: About; used to indicate an approximate date.

CLOSURE: The completion of a set of rigidly defined functions for a hazardous waste facility no longer in operation.

COD: Chemical Oxygen Demand, a measure of the amount of oxygen required to oxidize organic and oxidizable inorganic compounds in water.

COE: Corps of Engineers.

CONFINED AQUIFER: An aquifer bounded above and below by impermeable strata or by geologic units of distinctly lower permeability than that of the aquifer itself.

CONFINING UNIT: A geologic unit with low permeability which restricts the movement of groundwater.

CONTAMINATION: The degradation of natural water quality to the extent that its usefulness is impaired; there is no implication of any specific limits since the degree of permissible contamination depends upon the intended end use or uses of the water.

Cr: Chemical symbol for chromium.

CS: Communications Squadron.

DCM: Deputy Commander for Maintenance.

DCO: Deputy Commander for Operations.

DCRM: Deputy Commander for Resource Management.

DEQPPM: Defense Environmental Quality Program Policy Memorandum

DET: Detachment.

DIP: The angle at which a stratum is inclined from the horizontal.

DISPOSAL FACILITY: A facility or part of a facility at which hazardous waste is intentionally placed into or on land or water, and at which waste will remain after closure.

DISPOSAL OF HAZARDOUS WASTE: The discharge, deposit, injection, dumping, spilling, or placing of any hazardous waste into or on land or water so that such waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwater.

DoD: Department of Defense.

DOT: Department of Transportation

DOWNGRADIENT: In the direction of decreasing hydraulic static head; the direction in which groundwater flows.

DRMO: Defense Reutilization and Marketing Office.

DUMP: An uncovered land disposal site where solid and/or liquid wastes are deposited with little or no regard for pollution control or aesthetics; dumps are susceptible to open burning and are exposed to the elements, disease vectors and scavengers.

E & E: Ecology and Environment, Inc.

EFFLUENT: A liquid waste discharge from a manufacturing or treatment process, in its natural state, or partially or completely treated, that discharges into the environment.

EOD: Explosive ordnance disposal.

EP: Extraction Procedure, the EPA's standard laboratory procedure for leachate generation.

EPA: U.S. Environmental Protection Agency.

EPHEMERAL AQUIFER: A water-bearing zone typically located near the surface which normally contains water seasonally.

EROSION: The wearing away of land surface by wind, water, or chemical processes.

ETHYLENE GLYCOL: A liquid used for de-icing aircraft; it bioaccumulates and can exhibit toxic properties.

FAA: Federal Aviation Administration.

FACILITY: Any land and appurtenances thereon and thereto used for the treatment, storage and/or disposal of hazardous wastes.

FAULT: A fracture in rock along which the adjacent rock surfaces are differentially displace.

FLOODPLAIN: The lowland and relatively flat areas adjoining inland and coastal areas of the mainland and off-shore islands, including, at a minimum, areas subject to a one percent or greater chance of flooding in any given year.

FLOW PATH: The direction or movement of groundwater as governed principally by the hydraulic gradient.

FPTA: Fire Protection Training Area.

FTW: Flying Training Wing.

FY: Fiscal Year.

GC/MS: Gas chromatograph/mass spectrophotometer, a laboratory procedure for identifying unknown organic compounds.

GROUNDWATER: Water beneath the land surface in the saturated zone that is under atmospheric or artesian pressure.

GROUNDWATER RESERVOIR: The earth materials and the interstitial open spaces that contain groundwater.

HALON: A fluorocarbon fire extinguishing compound.

HALOGEN: The class of chemical elements including fluorine, chlorine, bromine, and iodine.

HARDFILL: Disposal sites receiving construction debris, wood, miscellaneous spoil material.

HARM: Hazard Assessment Rating Methodology.

HAZARDOUS SUBSTANCE: Under CERCLA, the definition of hazardous substance includes:

- 1. All substances regulated under Paragraphs 311 and 307 of the Clean Water Act (except oil);
- 2. All substances regulated under Paragraph 3001 of the Solid Waste Disposal Act;
- 3. All substances regulated under Paragraph 112 of the Clean Air Act;
- 4. All substances which the Administrator of EPA has acted against under Paragraph 7 of the Toxic Substance Control Act:
- 5. Additional substances designated under Paragraph 102 of the Superfund bill.

HAZARDOUS WASTE: As defined in RCRA, a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

HAZARDOUS WASTE GENERATION: The act or process of producing a hazardous waste.

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HEAVY METALS: Metallic elements, including the transition series, which include many elements required for plant and animal nutrition in trace concentrations but which become toxic at higher concentrations.

HNU Photoionizer - Field instrument used to determine the total concentration of organic and inorganic vapors and gases with an ionization potential of less than 11.7 ev. The instrument does not respond to methane or hydrogen cyanide.

HQ: Headquarters.

HWAP: Hazardous Waste Accumulation Point

HWMF: Hazardous Waste Management Facility.

HYDROCARBONS: Organic chemical compounds composed of hydrogen and carbon atoms chemically bonded. Hydrocarbons may be straight chain, cyclic, branched chain, aromatic, or polycyclic, depending upon arrangement of carbon atoms. Halogenated hydrocarbons are hydrocarbons in which one or more hydrogen atoms has been replaced by a halogen atom.

INCOMPATIBLE WASTE: A waste unsuitable for commingling with another waste or material because the commingling might result in generation of extreme heat or pressure, explosion or violent reaction, fire, formation of substances which are shock sensitive, friction sensitive, or otherwise have the potential for reacting violently, formation of toxic chemicals due to heat generation in such a manner that the likelihood of contamination of groundwater or escape of the substance into the environment is increased, any other reaction which might result in not meeting the air, human health, and environmental standards.

ILS: Instrument Landing System

INFILTRATION: The movement of water throught the soil surface into the ground.

IRP: Installation Restoration Program.

ISOPACH: Graphic presentation of geologic data, including lines of equal unit thickness that may be based on confirmed (drill hole) data or indirect geophysical measurement.

ISOPROPYL ALCOHOL: Flammable liquid used for cleaning small parts.

JP-4: Jet Propulsion Fuel No. 4, military jet fuel.

LCF: Launch Control Facility.

LEACHATE: A solution resulting from the separation or dissolving of soluble or particulate constituents from solid waste or other man-placed medium by percolation of water.

LEACHING: The process by which soluble materials in the soil, such as nutrients, pesticide chemicals or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water.

LENTICULAR: A bed or rock stratum or body that is lens-shaped.

LINER: A continuous layer of natural or man-made materials beneath or on the sides of a surface impoundment, landfill, or landfill cell which restricts the downward or lateral escape of hazardous waste, hazardous waste constituents or leachate.

LITHOLOGY: The description of the physical character of a rock.

LOESS: An essentially unconsolidated unstratified calcareous silt; commonly homogeneous, permeable and buff to gray in color.

LYSIMETER: A vacuum operated sampling device used for extracting pore water samples at various depths within the unsaturated zone.

MEK: Methyl ethyl ketone.

METALS: See "Heavy Metals."

MGD: Million gallons per day.

MOA: Military Operating Area.

MIBK: Methyl isobutyl ketone.

MOGAS: Motor gasoline.

MONITORING WELL: A well used to measure groundwater levels and to obtain samples.

MSL: Mean Sea Level.

MWR: Morale Welfare and Recreation.

NCO: Non-commissioned Officer.

NCOIC: Non-commissioned Officer In-Charge.

NDI: Non-destructive inspection.

NET PRECIPITATION: The amount of annual precipitation minus annual evaporation.

NGVD: National Geodetic Vertical Datum of 1929.

NPDES: National Pollutant Discharge Elimination System.

OEHL: Occupational and Environmental Health Laboratory.

OIC: Officer-In-Charge.

OMS: Organizational Maintenance Squadron.

ORGANIC: Being, containing or relating to carbon compounds, especially in which hydrogen is attached to carbon.

Pb: Chemical symbol for lead.

PCB: Polychlorinated biphenyl; liquids used as a dielectrics in electrical equipment.

PERCOLATION: Movement of moisture by gravity or hydrostatic pressure through interstices of unsaturated rock or soil.

PERMEABILITIY: The capacity of a porous rock, soil or sediment for transmitting a fluid without damage to the structure of the medium.

PERSISTENCE: As applied to chemicals, those which are very stable and remain in the environment in their original form for an extended period of time.

PD-680: Cleaning solvent.

pH: Negative logarithm of hydrogen ion concentration.

PL: Public Law.

POL: Petroleum, oils and lubricants.

POLLUTANT: Any introduced gas, liquid or solid that makes a resource unfit for a specific purpose.

POLYCYCLIC COMPOUND: All compounds in which carbon atoms are arranged into two or more rings, usually aromatic in nature.

POTASSIUM HYDROXIDE: Corrosive material, usually liquid, used for cleaning purposes.

POTENTIOMETRIC SURFACE: The surface to which water in an aquifer would rise in tightly cased wells open only to the aquifer.

PPB: Parts per billion by weight.

PPM: Parts per million by weight.

PRAMITOL: Herbicide.

PRECIPITATION: Rainfall.

PURPLE K: A bicarbonate-based fire extinguishing agent.

QUATERNARY MATERIALS: The second period of the Cenozoic geologic era, following the Tertiary, and including the last 2-3 million years.

RCRA: Resource Conservation and Recovery Act.

RECEPTORS: The potential impact group or resource for a waste contamination source.

RECHARGE AREA: A surface area in which surface water or precipitation percolates through the unsaturated zone and eventually reaches the zone of saturation. Recharge areas may be natural or man-made.

RECHARGE: The addition of water to the groundwater system by natural or artificial processes.

SANITARY LANDFILL: A land disposal site using an engineered method of disposing solid wastes on land in a way that minimizes environmental hazards.

SATURATED ZONE: That part of the earth's crust in which all voids are filled with water.

SATAF: Site Activation Task Force.

SAX'S TOXICITY: A rating method for evaluating the toxicity of chemical materials.

SCS: U.S. Department of Agriculture Soil Conservation Service.

SEISMICITY: Pertaining to earthquakes or earth vibrations.

SODIUM CHROMATE: Liquid used in refrigeration/air conditioning machines, contains toxic chromium.

SOLID WASTE: Any garbage, refuse, or sludge from a waste treatment plant, water supply treatment, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, or agricultural operations and from community activities, but does not include solid or dissolved materials in domestic sewage; solid or dissolved materials in irrigation return flows; industrial discharges which are point source subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended (86 USC 880); or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954 (68 USC 923).

SPG: Security Police Group.

SPILL: Any unplanned release or discharge of a hazardous waste onto or into the air, land, or water.

SPS: Security Police Squadron.

STORAGE OF HAZARDOUS WASTE: Containment, either on a temporary basis or for a longer period, in such a manner as not to constitute disposal of such hazardous waste.

STP: Sewage Treatment Plant.

SUPS: Supply Squadron.

SVS: Services Squadron.

TCE: Trichloroethylene.

TDS: Total Dissolved Solids, a water quality parameter.

TOC: Total Organic Carbon.

TOXICITY: The ability of a material to produce injury of disease upon exposure, inquestion, inhalation, or assimilation by a living organism.

TRANSMISSIVITY: The rate at which water is transmitted through a unit width of aquifer under a unit hydraulic gradient.

TREATMENT OF HAZARDOUS WASTE: Any method, technique, or process including neutralization designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize the waste or so as to render the waste nonhazardous.

TRNS: Transportation Squadron.

TSD: Treatment, storage or disposal.

TSDF: Treatment, storage or disposal facility.

TVOR: Tactical Very-high-frequency Omnidirectional Range, a ground-based radio transmitter for aircraft navigation.

UPGRADIENT: In the direction of increasing hydraulic static head; the direction opposite to the prevailing flow of groundwater.

UREA: Solid, toxic in high doses, used as a combination ground de-icer and fertilizer.

USAF: United States Air Force.

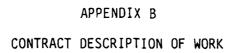
USDA: United States Department of Agriculture.

USFWS: United States Fish and Wildlife Service.

USGS: United States Geological Survey.

WATER TABLE: Surface of a body of unconfined groundwater at which the pressure is equal to that of the atmosphere.

WWTP: Wastewater Treatment Plant.



#### INSTALLATION RESTORATION PROGRAM (IRP)

#### PHASE II - CONFIRMATION/QUANTIFICATION (STAGE 1)

#### REESE AFB, TEXAS

#### I. DESCRIPTION OF WORK

The overall objective of the Phase II investigation is to define the magnitude, extent, direction and rate of movement of identified contaminants. A series of staged field investigations may be required to meet this objective. The contractor shall recommend any additional investigations required beyond this stage (Stage 1), including an estimate of costs.

The purpose of this task is to undertake a field investigation at Reese AFB TX: (1) to determine the presence or absence of contamination within the specified areas of investigation; (2) if possible, determine the magnitude of contamination and the potential for migration of those contaminants in the various environmental media; and (3) identify significant public health and environmental hazards of migrating pollutants based on State or Federal standards for those contaminants.

The Phase I IRP Report (mailed under separate cover) incorporates the background and description of the sites/zones for this task. To accomplish this survey effort, the contractor shall take the following actions:

#### A. GENERAL

1. The contractor shall monitor the ambient air above all exploratory well drilling and borehole operations with a photoionization meter or equivalent organic vapor detection device to identify potential generation of air pollutants, hazardous and/or toxic materials harmful to personnel or the environment. The results of these tests shall be included in boring logs. In addition, the contractor shall monitor drill cuttings for discoloration and odor. During drilling operations, if soil cuttings are suspected to be hazardous at a sampling location, the contractor shall containerize them in new, unused drums and test them for EP Toxicity and Ignitability. The results of these observations shall also be included in boring logs. In addition, one sample shall be collected from each of the other sampling locations not suspected to have hazardous cuttings and tested for EP Toxicity and Ignitability. A maximum of 35 samples shall be collected for EP Toxicity and Ignitability. At these locations all drill cuttings shall be accumulated on impermeable plastic tarpaulin sheets and covered with the same material. If the EP Toxicity results are positive, drill cuttings shall be containerized and turned over to the Base Civil Engineer. If the EP Toxicity results are negative the drill cuttings shall be disposed of in an area on base designated by the Base Civil Engineer. In addition, the contractor shall comply with all applicable EPA, AFOSH, OSHA, State and any other agencies' regulations/procedures concerning safety during drilling, sampling, and analysis procedures. If required, a safety plan shall be filed directly with these agencies.



- 2. All water samples collected shall be analyzed on site by the contractor for pH, temperature, and specific conductance. Sampling, maximum holding time, and preservation of samples shall strictly comply with the following references: Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), pp. 39-44; ASTM, Section 11, Water and Environmental Technology; Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057; and Methods for Chemical Analysis of Waters and Wastes, EPA Manual 600/4-79-020, pp. xiii to xix (1983). All chemical analyses (water and soil) shall meet the required limits of detection for the applicable EPA method identified in Attachment 1.
- 3. Locations where surface or sediment samples are taken or where soil exploratory borings are drilled shall be marked, where feasible, with a permanent marker; and the location marked on a project map showing all sites on Reese AFB.
- 4. Field data collected for each site shall be plotted and mapped. The nature, magnitude, and potential for contaminant flow within each zone to receiving streams and groundwaters shall be estimated. Upon completion of the sampling and analysis, the data shall be tabulated in the next R&D Status Report as specified in Sequence No. 1, Item VI below.
- 5. Determine the areal extent of the sites by reviewing available aerial photos of the base, both historical and the most recent panchromatic and infrared. Remote sensing photos may be acquired from the base; USDA Agricultural Stabilization and Conservation Service's Aerial Photography Division at 2505 Parleys Way, Salt Lake City UT 84109; EROS Data Center, Sioux Falls SD 57198; or USGS National Cartographic Information Center, Mail Stop 507, National Center, Reston VA 22092.
- 6. Split all water and soil samples. One set of samples shall be analyzed by the contractor and the other set of samples shall be delivered immediately (the same collection day) to the field government point of contact (POC). The field POC will select 10% of the split samples for subsequent shipment and analysis and deliver them to the contractor within 24 hours of receipt. The contractor shall supply all packing and shipping materials for the field POC's use in packaging the split samples. The contractor shall accept from the field POC the packaged samples for immediate shipment (within 24 hours) for analysis through overnight delivery to:

USAFOEHL/SA Bldg 140 Brooks AFB TX 78235-5501

- a. The samples sent to the USAFOEHL/SA shall be accompanied by the following information:
  - (1) Date and time collected
  - (2) Purpose of sample (analytes and sample group)
  - (3) Installation name (base)

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- (4) Sample number (on container)
- (5) Source/location of sample
- (6) Contract task numbers and title of project
- (7) Method of collection (bailer, suction pump, air-lift pump, etc.)
  - (8) Volumes removed before sample taken
- (9) Special conditions (use of surrogate standard special nonstandard preservations, etc.)
  - (10) Preservatives used
  - (11) Collector's name or initials
- b. Forward this information with each sample by properly completing an AF Form 2752A "Environmental Sampling Data" and/or AF Form 2752B "Environmental Sampling Data Trace Organics", working copies of which have been provided you under separate cover. Each sample container shall be labeled to reflect the data in (1), (2), (3), (4), (10) and (11) above. In addition, copies of field logs documenting samples collected during this survey should accompany the samples.
- c. Maintain complete and legible chain-of-custody records for all samples, field blanks, and quality control samples.
- 7. Analyze an additional 10% of all samples, for each parameter, for quality control purposes, as indicated in Attachment 1. Include all quality control procedures and data in draft and final reports.
- 8. For groundwater monitoring wells, comply with the USEPA Publication 330/9-S1-002, NEIC Manual for Groundwater/Subsurface Investigators at Hazardous Waste Sites for monitoring well installation. Use only screw type joints; no solvent glue can be used.
- 9. Wells shall be of sufficient depth to collect samples representative of aquifer quality and to intercept contaminants if they are present. Well development shall proceed until the discharge water is clear and free of sediment to the fullest extent possible. Well development procedures shall be fully documented in the Technical Report. As a precautionary measure all well installation/development fluids shall be containerized until analyses have shown a nonhazardous condition. If fluids are nonhazardous they shall be discharged to the nearest storm sewer, sanitary sewer or to grade based on guidance from the Base Civil Engineer. If fluids are hazardous they shall be turned over to the Base Civil Engineer in new 55-gallon drums.

- 10. Survey elevations of all newly installed monitoring wells and soil borings with respect to a USGS bench mark on or near base to an accuracy of 0.01 feet. Horizontally locate the new wells to an accuracy of 1 foot and record on site maps.
- 11. Measure water levels at all monitoring wells as feet below the ground surface or below the top of casing elevation to the nearest 0.01 feet. Report in terms of mean sea level (MSL). Measure static water levels in wells prior to sampling and at time of well development.
- 12. The exact location and number of monitoring wells, borings, and augerings for each site shall be determined in the field by the contractor in consultation with the base point of contact (POC) and the USAFOEHL program manager. The approximate locations and recommended number and depth of wells (including screening lengths), borings and augerings for sites under investigation are given in the site specific section of the task. Monitor wells and borings at all landfill sites shall be drilled around the perimeter and outside of the landfill areas unless the geophysical survey indicates there are no safety problems or buried drums.
  - 13. Drill all monitoring wells using the following specifications:
- a. Drill all wells that are less than 100 feet deep using hollow-stem auger equipment. With the hollow-stem auger method, a center stem, plug, and bit attached to the center stem may be inserted into the auger for use while drilling. This will prevent material from entering into the hollow-stem of the auger. Drill all wells that are equal to or more than 100 feet deep using mud/air rotary techniques. If a drilling fluid is required, the contractor shall use water from an operational well on base as specified by the Base Civil Engineer. Drilling fluid additives will not be used to insure that their components will not interfere with the chemical analyses to be performed on the samples. There are sufficient natural clays in the strata to be drilled to assure borehole integrity. Take samples for stratigraphic control purposes at 5-foot intervals and log them. Include pilot boring log and well completion summaries in the Technical Report (as specified in Item VI below).
- b. Total footage of all borings and wells in this task shall not exceed 1485 linear feet. Drill a maximum of four (4) wells. Maximum depth of each well shall not exceed 175 linear feet or to a depth necessary to fully penetrate the Ogallala Formation by drilling to the "blue clay" marker bed indicating the aquifer base. (Added information on formation marker beds provided under separate cover). Construct each well with 4-inch, Schedule 80 PVC casing using threaded, nonglued fittings. The borehole of these 4-inch ID (inside diameter) monitoring well shall be ten (10) inches diameter. Screen each well to a minimum of eight feet below the water-table surface, or below the top of the unconfined aquifer, as it is encountered during drilling. Total screen for all wells in this task shall not exceed 140 linear feet. The screen shall consist of 4-inch diameter PVC. Cap the screen at the bottom. All connections shall be flush-joint threaded. Prior to well completion, flush all boreholes constructed with mud rotary technique by using clean water. Centralizers shall be used to assure the plumb of these wells.

Gravel-pack each well with washed and bagged rounded sand or gravel with a grain size distribution compatible with the screen and formation. For monitoring wells, the screen slot opening shall be 0.010 or 0.020 inches. Place the pack from the bottom of the borehole to ten (10) feet above the top of the screen. Granulated or pelletized bentonite shall be tremied above the sand/gravel pack to a minimum thickness of five (5) feet. Place Type I Portland cement and bentonite grout from above the top of the bentonite seal to the land surface using tremie pipe with pressure grouting. Complete each well with the installation of a locking cap and clearly number the well with exterior paint. Locks shall be provided by the contractor for each well and a master key shall be delivered to the Air Force POC. Protective guard posts (cement-filled) may be required for wells in areas where moving equipment such as a tractor and riding lawn mower is operated. If well stick-up is of concern in an area (e.g., golf course, taxiway, access roads, etc.), complete the well flush with the land surface. Coordinate well completion method (stick-up vs flush) with USAFOEHL program manager and base POC. In all cases each well will be completed with a 2-foot by 2-foot Type I Portland cement collar around the well casing. This collar shall be ten (10) inches in thickness with approximately six (6) inches buried. The contractor shall take whatever measures necessary to prevent surface runoff from entering into any ground-flushed well.

- 14. Develop each well with a submersible pump, bailer, high velocity jet, surge block, and/or airlift method until the water is clear of suspended solids. If mud is used during drilling, polyphosphate dispersing agents may be used to help with mud removal.
- 15. Purge wells prior to sampling. Purging will be complete when three well or bore volumes of water have been displaced or until the pH, temperature, specific conductance, color, and odor of the discharge is stabilized. Conduct purging operation using a submersible pump. Conduct all sampling using a Teflon bailer. Purging techniques will be fully documented in the Technical Report. As the first step of groundwater sampling operations at each well, take water level measurements to the nearest 0.01 foot with respect to an established surveyed mark-point on top of the well casing.

### 16. Decontamination Procedures

a. All sampling equiment, including components of sampling interface, shall be decontaminated prior to use between samples, and between sampling locations to avoid cross-contamination. Sampling equipment and interface shall be thoroughly washed with a laboratory-grade detergent followed by clean water, solvent (methanol), and distilled water rinses. Sufficient time shall be allowed for the solvent to evaporate and for the equipment to dry completely. The monofilament line or steel wire used to lower bailers into the well shall be dedicated to each well or discarded after each use. The calibrated water level indicator for measuring well volume and product elevation must be decontaminated before use in each well. Water sampling shall be conducted from the background monitoring wells to the "least" contaminated and finally the "most" contaminated wells, if possible.

- b. The drilling rig and tools shall receive thorough initial cleaning and be decontaminated after each borehole. As a minimum, drilling bits, Kelly bar and drill stem shall be steam cleaned after each borehole is installed. Drilling shall proceed from the "least" to the "most" contaminated areas, if possible.
- For those methods which employ gas chromatography (GC) as the analytical technique (i.e., E601, E602, E608, E617, SW8010, SW8020, etc.) positive confirmation of identity is required for all analytes having concentrations higher than the Method Detection Limit (MDL). This positive confirmation shall be conducted by second-column GC; however, gas chromatography/mass spectroscopy (GS/MS) can be used for positive confirmation if the quantity of each analyte to be confirmed is above the detection level of the GC/MS instrument. Analytes which cannot be confirmed will be reported as "Not Detected" in the body of the report, but results of all second-column GC or GC/MS confirmational analyses are to be included in the report appendix along with other raw analytical data. Quantification of confirmed analytes will be based upon the first-column analysis. The maximum number of secondcolumn confirmational analyses that will be funded under this task is fifty percent (50%) of actual field samples. The total number of samples for each GC method listed in Attachment 1 includes this allowance. If GC/MS, or a combination of second-column GC and GC/MS, is used, the total cost of all such analyses for a particular parameter shall not exceed the funding allowed for positive confirmation using only second-column GC.
- 18. Perform shallow soil augering using a hand or power auger. Perform a maximum of ten (10) shallow soil augerings. Total footage shall not exceed twenty (20) feet. Collect a maximum of two (2) soil samples from each augering (maximum of twenty (20) auger samples for chemical analyses; see also paragraph 139).
- augering, shall be 175 feet. Perform a maximum of 35 borings. Collect soil samples for chemical analyses at site specific intervals (see Section IB later) from the ground surface, and at depths suspected of containing waste materials, and at any major soil interface but not to exceed five (5) samples per boring for shallow boreholes (30') and seven (7) samples per boring for deep boreholes (175') (maximum of 153 borehole samples for chemical analysis). Obtain stainless steel split-spoon samples, ASTM Method D-1536. The exact location of boreholes shall be determined in the field by the contractor and approved by the base POC and the USAFOEHL Program Manager.
- 20. Upon completion of operations at each boring, grout the borehole from the bottom of the hole to the land surface in order to prevent cross-aquifer contamination.
- 21. Whenever possible, measure water levels in all boreholes after the water level has stabilized and if not possible document why.
- 22. Conduct a literature search to complement the Phase I Report (mailed under separate cover) for local hydrogeologic conditions. Data generated in this literature search shall complement Phase I Report data such

that the following list will be complete. This list of data shall be utilized by the contractor to pinpoint well locations, sampling points, etc. In addition, this data shall be included in Appendix D of the Technical Report of this effort.

- a. Topographic data
- b. Geologic data
  - (1) Structure
  - (2) Stratigraphy
  - (3) Lithology
- c. Hydrologic data
- (1) Location of existing wells, observation holes and springs within a 1-mile radius of sites to be investigated
  - (2) Groundwater table and potentiometric contours
  - (3) Depth to water
  - (4) Quality of water
  - (5) Recharge, discharge, and contributing areas
- d. Data on existing wells, observation holes, and springs within a 1-mile radius of sites to be investigated
  - (1) Location, depth, diameter, type of wells, and logs
- (2) Static and pumping water level, hydrographs, yield, specific capacity, quality of water
  - (3) Present and projected groundwater development and use
- (4) Corrosion, incrustation, well interference, and similar operation and maintenance problems
- (5) Location, type, geologic setting, and hydrographs of springs
  - (6) Observations well networks

- (7) Existing water sampling sites
- (8) Summary of analysis of water quality data from these wells, observation holes and/or springs

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- e. Aquifer data
  - Type, such as unconfined, artesian, or perched
  - (2) Thickness, depths, and formational designation
  - (3) Boundaries
  - (4) Transmissivity, storativity, and permeability
  - (5) Specific retention
  - (6) Discharge and recharge
  - (7) Ground and surface water relationship
  - (8) Aquifer models
- f. Climatic data
  - (1) Precipitation
  - (2) Evapotranspiration
- 23. All well drilling, development, purging, and sampling methods must conform to State and other applicable regulatory agencies' requirements. Include in the Appendix the names of all approving regulatory personnel and dates that they accepted drilling techniques, well development, purging, and sampling methods.
- 24. All chemical/physical analyses shall conform to State and other applicable federal and local regulatory agencies' legal requirements. If laboratory certification by any regulatory agency is required for any analyses, they shall be conducted in a certified laboratory.
- 25. In addition to all analyses results, summarize sampling methods used, detection levels, and holding times in a table included in the Appendix.
- 26. Include second column confirmation results in the report. These shall include what columns were used, conditions, and the two different retention times for major components.
- 27. Internal quality control procedures and data (lab blanks, lab spikes, and lab duplicates), as well as field quality control measures, shall be included in the draft final and final Technical Reports.
- 28. Include in the report an inventory of all wells on base (active and abandoned). If well is abandoned state reason, if known.
- 29. Determine available techniques for well abandonment that are applicable to the type of monitoring wells and geologic conditions. Consider that these wells will be abandoned at some future date after the study

objectives have been met and there is no longer a need for the wells. Recommend a candidate method(s) or technique to apply, including costs. The actual process of well abandonment is not a part of this study at this time.

- 30. Technical Operations Plan (TOP): Within two (2) weeks after Notice to Proceed (NTP) for the delivery order, the contractor shall develop a Technical Operations Plan based on the requirements listed herein. This plan shall be explicit with regard to field procedures. Include, but do not limit the plan to field decontamination operations, sampling protocol, QA/QC field and laboratory procedures, field schedule, etc. A guideline for the plan is provided under separate cover. Only these requirements of the Data Item Descriptions (DID), Sequence No. 20, Item VI below shall be applied.
- B. SITE SPECIFICS. (See Figure 1, Attachment 2 for site location map.) In addition to items delineated in Section A above, conduct the following specific actions at the following sites:

#### 1. Industrial Waste Lake (SI-1)

- a. Install four (4) soil borings around the perimeter of the lake. Three of these are shallow borings to a depth of 30 feet. The fourth one shall be installed east-southeast of the lake between the lake and Highway Spur 309. The fourth boring shall have a maximum depth of 175 feet. Split-spoon samples shall be taken at 5-foot intervals with option to sample at changes in soil type or strata giving positive screen for volatile components, odor, and discoloration. If odor, color, and the reading of an organic vapor analyzer (or HNu meter) do not show contamination, soil samples shall be taken for screening analyses, preferably, at 3, 15, and 30 foot depths for the shallow borings, and at 3, 15, 30, and 50 foot depths, and the capillary zone immediately above the Ogallala aquifer for the deep boring. Total footage of the borings shall not exceed 290 feet. Total number of soil samples shall not exceed 22 samples.
- b. Analyze these soil samples for purgeable organic compounds (SW8010 and SW8020), oil and grease (E413.2 modified for soils), phenols (SW3550, then SW8040), base/neutral/acid extractable organics (SW3550, then SW8270), organochlorine pesticides and PCBs (SW3550, then SW8080), organophosphorus pesticides (SW3550, then SW8140) and chlorinated herbicides (SW8150).
- c. Convert the deep boring into a 4-inch ID (inside diameter) monitoring well. The length of the milled screen shall not exceed thirty (30) feet. Insure that majority of the screen is in contact with the water-bearing interval of the Ogallala formation.
- d. Two (2) rounds of groundwater samples shall be taken from this conitoring well 30 to 45 days apart. During each round of well sampling, one (1) groundwater sample will be collected. Analyze each sample for purgeable organic compounds (E601 and E602), oil and grease (EPA 413.2), phenols (E604), total dissolved solids (TDS) (E160.1), base/neutral/acids extractable organics (E625), organochlorine pesticides and PCBs (E608), organophosphorus pesticides (SW8140), chlorinated herbicides (A509B) and primary metals (E200.7).

- e. Collect one (1) lake water and four (4) sediment samples for chemical screen analyses. The sediment samples shall be collected at: (1) lake bottom, (2) the lake inlet delta area, (3) the rainwater drainage channels along Highway Spur 309 and between the picnic area and golf course, and (4) the roadside ditch discharge point southwest of golf green no. 2 at the road intersection. Collect another lake water sample for chemical screen analyses in 30 to 45 days.
- f. Analyze these four (4) sediment samples for purgeable organics (SW8010 and SW8020), oil and grease (E413.2 modified for soils), phenols (SW3550, then SW8040), base/neutral/acid extractable organics (SW3550, then SW8270), organochlorine pesticides and PCBs (SW3550, then SW8080), organophosphorus pesticides (SW3550, then SW8140), and chlorinated herbicides (SW8150). Analyze the two (2) lake water samples for the parameters listed in paragraph IB1d above.
- 2. Sewage Lake (SI-2), including East Landfill (D-3), North Landfill (D-4), West Landfill (D-5) and Inactive Fire Training Areas (FT-3)

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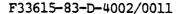
- a. Perform a surface geophysical survey. An electromagnetic survey shall be conducted to define the perimeter of the landfills and to delineate the possibility and potential of migration of an underground contaminant plume. A proton precession magnetometer survey shall be conducted to determine the presence/absence of subsurface metal objects either in the landfills or adjacent to them where interference with drilling would occur.
- b. Install four (4) soil borings between each of the surrounding sites and the lake. Three of the borings shall be 30-feet deep each, a total of 90 feet. The fourth one shall have a maximum depth of 175 feet and shall be installed near and south of Landfill D-3. Split-spoon samples shall be taken at 5-foot intervals with option to sample at changes in soil type or strata giving positive screen for volatile components, odor, and discoloration. If odor, color, and the reading of an organic vapor analyzer (or HNu meter) do not show contamination, soil samples shall be taken for screening analyses, preferably at 3, 15, and 30 foot depths for the shallow borings, and at 3, 15, 30, and 50 foot depths, and the capillary zone immediately above the Ogallala aquifer for the deep boring. Total boring length shall not exceed 290 feet, and the number of soil samples for chemical analyses shall not exceed 22 samples.
- c. Analyze the soil samples for purgeable organic compounds (SW8010 and SW8020), oil and grease (E413.2 modified for soils) and phenols (SW3550, then SW8040).
- d. Convert the deep borehole into a 4-inch ID monitoring well. The length of the milled screen shall not exceed thirty (30) feet. Insure that the majority of the screen is in contact with the water-bearing interval of the Ogallala formation.
- e. Two (2) rounds of groundwater samples shall be taken from this monitoring well 30 to 45 days apart. During each round of well sampling, one (1) groundwater sample will be collected. Analyze each sample for purgeable

organic compounds (E601 and E602), oil and grease (E413.2), phenols (E604), TDS (E160.1), base/neutral/acids extractable organics (E625), organochlorine pesticides and PCBs (E608), organophosphorus pesticides (SW8140), chlorinated herbicides (A509B) and primary metals (E200.7).

- f. Collect four (4) sediment samples from Sewage Lake as follows: (1) in the area of the sewage plant discharge point, (2) in the low flow area at the outlet of the discharge channel into the lake, and (3) at the lake bottom (two samples). A 2-foot split-spoon sampler shall be driven into the lake sediment and the top and bottom 1-foot sections shall be separated as two samples for screening analyses.
- g. Analyze the eight (8) sediment samples for purgeable organic compounds (SW8010 and SW8020), oil and grease (E413.2 modified for scils), phenols (SW3550, then SW8040), base/neutral/acids extractable organics (SW3550, then SW8270), organochlorine pesticides and PCBs (SW3550, then SW8080), organophosphorus pesticides (SW3550, then SW8140) and chlorinated herbicides (SW8150).
- h. Two (2) rounds of water samples shall be taken from the sewage lake 30 to 45 days apart. During each round of lake sampling, one (1) water sample will be collected at approximately the same location. Analyze each sample for purgeable organic compounds (E601 and E602), oil and grease (E413.2), phenols (E604), TDS (E160.1), base/neutral/acids extractable organics (E625), organochlorine pesticides and PCBs (E608), organophosphorus pesticides (SW8140), chlorinated herbicides (A509B), and primary metals (E200.7).
  - 3. POL Storage Area (Aqua System) Spill Site (SP-1)
- a. Perform a soil gas survey using a slambar with extension, an organic vapor analyzer (OVA), and an oxygen meter/explosimeter.
- b. Install up to four (4) soil borings with a maximum depth of 30 feet, a total of 120 linear feet. The soil gas survey shall assist in determining the boring locations. Observation of odor, discoloration, and OVA reading shall be recorded on the boring logs. Split-spoon samples shall be taken at 5-foot intervals with option to sample at changes in soil type or strata giving positive screen for volatile components, odor, and discoloration. If odor, color, and the reading of an organic vapor analyzer (or HNu meter) do not show contamination, soil samples shall be taken for screening analyses, preferably at 3, 10, 15, 20, and 30 foot depths for the shallow thirty (30) foot borings. Up to a maximum of 20 soil samples shall be taken and analyzed for purgeable organics (SW8010 and SW8020), petroleum hydrocarbons (E418.1 modified for soils), oil and grease (E413.2 modified for soils), chromium (SW3050, then SW7190) and lead (SW3010, then SW7420).
  - 4. Southwest Landfill (D-1)
- a. Perform a surface geophysical survey using electromagnetic conductivity and magnetometer to delineate the buried trenches and to locate the existence or confirm the absence of buried drums.

- b. Install up to four (4) soil borings with a maximum of 290 linear feet. Three of the borings shall have an average depth of 30 feet, and the deep one, tapping the Ogallala aquifer, having a maximum depth of 175 feet. Split-spoon samples shall be taken at 5-foot intervals with option to sample at changes in soil type or strata giving positive screen for volatile components, odor, and discoloration. If odor, color, and the reading of an organic vapor analyzer (or HNu meter) do not show contamination, soil samples shall be taken for screening analyses, preferably at 3, 15, and 30 foot depths for the shallow borings, and at 3, 15, 30, and 50 foot depths, and the capillary zone immediately above the Ogallala aquifer for the deep boring. The deep boring shall be located in the southeast portion of the landfill so that it can be converted to a downgradient monitoring well.
- c. Analyze these soil samples for purgeable organics (SW8010 and SW8020), oil and grease (E413.2 modified for soils), organochlorine pesticides and PCBs (SW3550, then SW8080), organophosphorus pesticides (SW3550, then SW8140), chlorinated herbicides (SW8150) and primary metals (SW3050, then SW6010).
- d. Convert the deep boring into a 4-inch ID monitoring well. The length of the milled screen shall not exceed thirty (30) feet. Insure that the majority of the screen is in contact with the water-bearing interval of the Ogallala formation.
- e. Two (2) rounds of groundwater samples shall be taken from this monitoring well 30 to 45 days apart. During each round of well sampling, one (1) groundwater sample will be collected. Analyze each sample for purgeable organic compounds (E601 and E602), oil and grease (E413.2), phenols (E604), TDS (E160.1), base/neutrals/acids extractable organics (E625), organochlorine pesticides and PCBs (E608), organophosphorus pesticides (SW8140), chlorinated herbicides (A509B) and primary metals (E200.7).
  - 5. Civil Engineering Paint Shop Trench (SI-4)
- a. Install one (1) deep soil boring having a maximum depth of 175 feet at or near this site, and convert this boring into an Ogallala aquifer monitoring well. The length of the milled screen shall not exceed thirty (30) feet. Insure that the majority of the screen is in contact with the waterbearing interval of the Ogallala formation.
- b. Split-spoon samples shall be taken at 5-foot intervals with option to sample at changes in soil type or strata giving positive screen for volatile components, odor, and discoloration. If odor, color, and the reading of an organic vapor analyzer (or HNu meter) do not show contamination soil samples shall be taken for screening analyses, preferably at 3, 15, 30, and 50 foot depths, and the capillary zone immediately above the Ogallala acquifer. The paint trench has been excavated to remove the contaminated soil. The excavated trench was then filled with clean soil. Therefore, no samples will be taken in the clean fill area for chemical analysis. Obtain chemical analyses data on excavated paint trench soil from base POC and include in analysis of site and in the final technical report. Analyze the soil samples for purgeable organics (SW8010 and SW8020), oil and grease (E413.2 modified

- for soils), phenols (SW3550, then SW8040), base/neutral/acids extractable organics (SW3550, then SW8270), cadmium (SW3050, then SW7130), chromium (SW3050, then SW7190), lead (SW3050, then SW7420), nickel (SW3050, then SW7520) and zinc (SW3050, then SW7950).
- c. Collect one (1) groundwater sample from this monitoring well, at two different times (30 to 45 days apart), and analyze for purgeable organics (E601 and E602), oil and grease (E413.2), phenols (E604), TDS (E160.1), base/neutrals/acids extractable organics (E625), and primary metals (E200.7).
- 6. Active Fire Training Area (FT-1), Including Drainage Impoundment (SI-3)
- a. Install two (2) soil borings, each 30 feet deep; one located hydraulically upgradient and the other located hydraulically downgradient of the site. Split-spoon samples shall be taken at 5-foot intervals with option to sample at changes in soil or strata giving positive screen for volatile components, odor, and discoloration. If odor, color, and the reading of an organic vapor analyzer (or HNu meter) do not show contamination, soil samples shall be taken for screening analyses, preferably, at 3, 15, 20, and 30 foot depths. Analyze up to a maximum of eight (8) soil samples for purgeable organics (SW8010 and SW8020), oil and grease (E413.2 modified for soils), phenols (SW3550, then SW 8040), chromium (SW3050, then SW7190) and lead (SW3050, then SW7420).
- b. Collect two (2) grab samples in the first six inches of the surface soil: one in the natural drainage path from the sump outlet and one in the area of the natural depression (playa). Analyze these two (2) samples for the parameters listed in paragraph IB6a above.
  - 7. Northwest Landfill/Rubble Area (D-11)
- a. Perform a surface geophysical survey using electromagnetic and magnetometry to determine the presence or absence of buried drums and the perimeter of the landfill.
- b. Install up to four (4) shallow borings after the analysis of geophysical survey data. The depth of each borehole shall be 30 feet and the maximum length of all four (4) boreholes shall be 120 feet. Split-spoon samples shall be taken at 5-foot intervals with option to sample at changes in soil type or strata giving positive screen for volatile components, odor, and discoloration. If odor, color, and the reading of an organic vapor analyzer (or HNu meter) do not show contamination, soil samples shall be taken for screening analyses, preferably, at 3, 15, and 30 foot depths.
- c. Analyze these soil samples from the four (4) boreholes for purgeable organics (SW8010 and SW8020), oil and grease (E413.2 modified for soils), and polynuclear aromatic hydrocarbons (SW3550, then SW8130).



- 8. Hurlwood Acquisition and Landfill (D-7)
- a. Install protective casing, guard post, and lock for the five (5) inactive wells on the property. Survey and locate these wells on a map. Collect five (5) groundwater samples (one from each well) for purgeable organics (E601 and E602), oil and grease (E413.2), phenols (E604), TDS (E160.1), base/neutral/acids extractable organics (E625), and primary metals (E200.7).
- b. Perform a surface geophysical survey to delineate the D-7 landfill perimeter and to detect the existence or confirm the absence of buried drums.
- c. Install two (2), 30-foot soil borings in the landfill after geophysical survey. Split-spoon samples shall be taken at 5-foot intervals with option to sample at changes in soil type or strata giving positive screen for volatile components, odor, and discoloration. If odor, color, and the reading of an organic vapor analyzer (or HNu meter) do not show contamination, soil samples shall be taken for screening analyses, preferably, at 3, 15, and 30 foot depths for the shallow 30 foot borings.
- d. Analyze these soil samples for purgeable organics (SW8010 and SW8020), oil and grease (E413.2 modified for soils), phenols (SW3550, then SW8040) and arsenic (SW3050, then SW7060).
- 9. Sewage Digester Sludge Spreading Area (between 1st and 2nd Streets) (SS-1)

Install up to ten (10) soil borings at two (2) feet depth each (total of twenty (20) linear feet) using hand or power auger. Locate these borings on a map. Collect up to a maximum of twenty (20) soil samples at 0.5 and 2 foot depths and analyze for purgeable organics (SW8010 and SW8020), oil and grease (E413.2 ,modified for soils), base/neutral/acids extractable organics (SW3550, then SW8270), arsenic (SW3050, then SW7060), cadmium (SW3050, then SW7130), chromium (SW3050, then SW7190), copper (SW3050, then SW7210), lead (SW3050, then SW 7420), nickel (SW3050, then SW7520), and zinc (SW3050, then SW7950). These two foot boreholes do not need to be pressure grouted as the 30 foot and 175 foot borings.

#### C. WELL AND BOREHOLE CLEANUP

Remove all well and borehole area drill cuttings after determination of their nonhazardous condition, and clear the general area following the completion of each well and borehole. Only those drill cuttings and drilling fluids suspected as hazardous waste (based on discoloration, odor, organic vapor detection instrument and/or other testing) shall be properly containerized and moved by the contractor to locations within the installation specified by the base POC or USAFOEHL program manager for government disposal. The suspected hazardous wastes shall be tested by the contractor for EP Toxicity and Ignitability. The results of these analyses will be documented in the Technical Report. The contractor is not responsible for the ultimate disposal of either the hazardous drill cuttings or the well

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installation/development fluids. Disposal will be accomplished by the appropriate base offices using base resources. However, any hazardous wastes generated by borehole or well installation/development shall be containerized in new 55-gallon drums and delivered to an accumulation point on base as specified by the Base Civil Engineer.

#### D. HEALTH AND SAFETY

Comply with USAF, OSHA, EPA, State and local health and safety regulations regarding the proposed work effort. Use EPA guidelines for designating the appropriate levels of protection at the study sites. Prepare a written Health and Safety Plan for the proposed work and coordinate it directly with applicable regulatory agencies. Provide an information copy of the Health and Safety Plan to the USAFOEHL prior to commencing field operations (i.e., drilling and sampling).

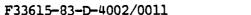
#### E. DATA REVIEW

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- 1. Tabulate field and analytical laboratory results, including field and laboratory parameters and QA/QC data, and incorporate them into the monthly R&D Status Reports. Forward them to the USAFOEHL for review as soon as they become available as specified in Item VI below. Field and laboratory parameters shall include time and dates for sample collection, extraction procedures/methods and analysis, along with the EPA/Method maximum holding times.
- 2. Upon completion of all analyses, tabulate and incorporate all results into an Informal Technical Information Report (Sequence 3, Item VI below) and forward the report to USAFOEHL for review.
- 3. Data/results, generated throughout this undertaking, indicating a possibility of health risk (e.g., contaminated drinking water aquifer) shall be reported immediately via telephone to the USAFOEHL Program Manager.

#### F. REPORTING

- 1. A draft report delineating all findings of this field investigation shall be prepared and forwarded to the USAFOEHL (Sequence 4, Item VI below) for Air Force review and comment. This report shall include a discussion of the regional/site specific hydrogeology, well and boring logs, data from water level surveys, groundwater surface and gradient maps, water quality and soil analysis results, available geohydrologic cross sections, and laboratory and field quality assurance/quality control information. The report shall follow the USAFOEHL format (mailed under separate cover). The format is an integral part of this delivery order.
- 2. The results section of the report shall include water and soil analyses results, field quality control sample data, internal laboratory control data (lab blanks, lab spikes, and lab duplicates), and laboratory quality assurance procedures. Provide second column confirmation results and include which columns were used, the conditions, and retention times. Summarize the specific collection techniques, analytical method, holding time,



and limit of detection for each analyte (Standard Methods, EPA, etc.). When the detection limits specified in Attachment 1 have not been met (i.e., because of interference, matrix effects, etc.), the contractor shall provide explanations for the higher detection limits.

- 3. The recommendation section shall address each site and list them by categories. Category I shall consist of sites where no further action (including remedial action) is required. Data for these sites are considered sufficient to rule out significant public health or environmental hazards. Category II sites are those requiring additional Phase II effort to determine the direction, magnitude, rate of movement and extent of detected contaminants. The contractor shall identify potential environmental consequences of discovered contamination, where known. Category III sites are sites that will require remedial actions (ready for IRP Phase IV actions). Recommendations for Category III sites shall include any possible influence on sites in Categories I and/or II due to their connection to the same hydrological system. Any dependency between sites in different categories shall be clearly stated. The contractor shall include a list of candidate remedial action alternatives including Long Term Monitoring (LTM) as remedial action and corresponding rationale, that, as a minimum, should be considered in selecting the remedial action for a given site. The list shall encompass alternatives that could potentially attain applicable environmental standards. For contaminants that do not have standards, the contractor may use EPArecommended safe levels for noncarcinogens (Health Advisory or Suggested-No-Adverse-Response Levels) and target levels for carcinogens (1 x 10 cancer risk level). Unless specifically requested, comprehensive cost, including cost/benefit analyses of remedial action alternatives, shall not be included. However, in those situations where field survey data indicate immediate corrective action is necessary, the contractor shall present specific, detailed recommendations. For each category above, the contractor shall summarize the results of field data, environmental or regulatory criteria, or other pertinent information supporting conclusions and recommendations.
- 4. The contractor shall provide cost estimates by line item for future efforts recommended for Category II sites and LTM Category III sites. These estimates shall be provided as requested in Sequence 19, Item VI below. Unless specifically requested, no cost estimate shall be submitted with draft reports. For Category II sites, develop detailed site-specific estimates using prioritized costing format (i.e., cost of conducting the required work on: the highest priority site only; the first two highest priority sites only; the first three highest priority sites only; etc., until all required work is discretely costed) for the proposed work effort which is based on the Air Force-approved priority which was recommended by the contractor. Consider the type of contaminants, their magnitude, the direction and rate of their migration, and their subsequent potential for environmental and health consequences when prioritizing sites. For Category III sites slated for long-term monitoring, develop site-specific estimates which detail the costs associated with permanent installation of monitoring wells, groundwater sampling interface, including permanent installation of pumps and

sampling lines and four quarterly (1 year period) sample collections and laboratory chemical analyses of groundwater, etc. Only the cost requirement outlined in the DID of Sequence 19 need be submitted.

- 5. Technical Operations Plan (TOP): The contractor shall develop a Technical Operations Plan based upon the technical requirements for Category II sites as requested by Sequence 19, Item VI below. This plan shall be expicit with regards to field procedures. Include, but do not limit the plan to field decontamination operations, sampling protocol, QA/QC field and laboratory procedures, field schedule, etc. A guideline for the plan is provided under separate cover.
- 6. All well drilling, development, purging, and sampling methods must conform to State and/or other regulatory agencies' requirements. Cite references for the requirements in the Technical Report appendix.

#### G. MEETINGS

The contractor's project leader shall attend two (2) meetings to take place at times to be specified by the USAFOEHL. The meetings shall take place at Reese AFB for a duration of one day each.

#### II. SITE LOCATION AND DATES:

Reese AFB, near Lubbock, Texas Date to be established

#### III. BASE SUPPORT:

- A. The base Point of Contact (POC) shall receive from the contractor the split samples and then select 10% of them, package them, and then deliver them back to the contractor within 24 hours for subsequent overnight shipment to USAFOEHL/SA as stated in Paragraph IA6.
- B. The Base Civil Engineer shall assign accumulation points within the installation for the contractor to use to deliver any hazardous drill cuttings or hazardous well installation/development fluids generated from the required work.
- C. The Base Civil Engineer will take custody of any hazardous drill cuttings or hazardous well installation/development fluids and properly dispose of the material according to applicable state/federal regulations.
- D. The Base POC will make available to the contractor data from the paint trench soil chemical analysis.
- E. The Base Civil Engineer will provide a potable water source for use by the contractor during well drilling/development operations if required.
- IV. GOVERNMENT FURNISHED PROPERTY: None

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#### V. GOVERNMENT POINT OF CONTACT:

A. USAFOEHL Program Manager

Mr Dennis E. Lundquist USAFOEHL/TSS Brooks AFB TX 78235-5501 (512) 536-2158, 2159 AV 240-2158/2395 1-800-821-4528 B. Base Point of Contact (POC)

Lt Gregory G. Zigulis USAF Hospital/SGPB Reese AFB TX 79489-5300 (806) 885-3327, 3328 AV 838-3327/3328

C. MAJCOM Monitor

Lt Col Ronald L. Schiller HQ ATC/SGPB Randolph AFB TX 78150-5001 (512) 652-5271 AV 487-5271

#### VI. CONTRACT DATA ITEM DESCRIPTIONS (DID)

In addition to sequence numbers 1, 5, and 11 in Attachment 1 to the contract, which are applicable to all orders, the sequence numbers listed below are applicable to this order. Also shown are data applicable to this order.

Seq. No.	Block 10	Block 11	Block 12	Block 13	Block 14
3	O/Time	*	*		4
19**	O/Time	86 MAY 19	86 JUN 02		12 -
7	O/Time	86 JUN 02	86 JUN 16		7
4	One/R	86 AUG 18	86 OCT 14	87 MAY 21	***
19**	O/Time	86 AUG 18	86 OCT 14		7
14	Monthly	86 JUN 16	86 JUL 01	***	2
15	Monthly	86 JUN 16	86 JUL 01	***	2

<sup>\*</sup>Upon completion of analytical effort before submission of the first draft Technical Report.

\*\*\*Two draft reports and one final report are required. Incorporate Air Force

F33615-33-D-4002/0011

<sup>\*\*</sup>Two Technical Operations Plans (TOP) are required for this stage. The first one is for the current effort and is due within two (2) weeks after the Notice to Proceed (NTP). The second one shall be sent with the final Technical Report and shall detail the plans for any required follow-on work for Category II sites.

comments into the second draft and final report as specified by the USAFOEHL. Supply the USAFOEHL with a single copy of the first draft, second draft, and final reports for acceptance prior to distribution. Distribute all report copies as specified by the USAFOEHL. Supply 25 copies of each draft report and 50 copies plus the original camera-ready copy of the final Technical Report.

\*\*\*\*Monthly thereafter.

Attachment 1
Reese AFB Phase II Stage 1

Analytical Methods, Detection Limits, and Number of Samples

PARAMETER	METHOD	DECTECTION LIMIT (d)	NO. OF SAMPLES	QA	TOTAL SAMPLES
Purgeable Organic	SW8010 & SW8020	1 mg/Kg	127 soil	13 soil	204 soil <sup>f</sup>
Compounds	E601 & E602	a	17 water	2 water	28 water <sup>g</sup>
Pesticides	SW3550, then SW8080 SW3550, then SW8140				
	SW8150	1 mg/Kg	40 soil	4 soil	64 soil <sup>h</sup>
	E608, SW8140 and A509B	a	10 water	1 water	16 water <sup>1</sup>
Base/neutral/ acids extractable organics	SW3550, then SW8270 E625	1 mg/Kg a	51 soil 17 water	5 soil 2 water	82 soil <sup>j</sup> 28 water <sup>k</sup>
Oil & Grease	E413.2 (modified for soils)	100 µg/g	127 soil	13 soil	140 soil
(using IR)	E413.2	200 μg/L	17 water	2 water	19 water
Petroleum Hydrocarbons	E418.1 (modiffor soils)	ied 10 mg/Kg	20 soil	2 soil	22 soil
Polynuclear Aromatic Hydrocarbons	SW3550, then SW8100	a	12 soil	1 soil	19 soil <sup>1</sup>
Phenols	SW3550, then SW8040 E604	a a	61 soil 17 water	6 soil 2 water	98 soil <sup>m</sup> 19 water
Total Dissolved				٠	
Solids (TDS)	E1 60.1	1 mg/l	17 water	2 water	19 water
Metals, Primary	SW3050, then SW6010 E200.7	e a	14 soil 17 water	1 soil 2 water	15 soil 19 water
F33614-83-D-40	03/0011	23			

F33614-83-D-4003/0011

PARAMETERS	METHOD	DETECTION LIMIT (d)	NO. OF SAMPLES	QA	TOTAL SAMPLES
Arsenic	SW3050, then SW7060	0.1 mg/Kg	26 soil	3 soil	29 <b>s</b> oil
Cadmium ,	SW3050, then SW7130	0.5 mg/Kg	25 soil	3 soil	28 <b>s</b> oil
Chromium	SW3050, then SW7190	5 mg/Kg	55 soil	6 soil	61 soil
Copper	SW3050, then SW7210	2 mg/Kg	20 soil	2 soil	22 soil
Lead	SW3050, then SW7420	10 mg/Kg .	55 soil	6 soil	61 soil
Nickel	SW3050, then SW7520	0.4 mg/Kg	25 soil	3 soil	28 <b>s</b> oil
Zinc	SW3050, then SW7950	0.05 mg/Kg	25 soil	3 soil	28 soil
рН	E150.1		17 water	2 water	19 water
EP Toxicity (Metals)	SW Manual	þ	35 soil	4 soil	39 soil
Ignitability	SW1010	С	35 soil	4 soil	39 soil

<sup>&</sup>lt;sup>a</sup>Detection limits as specified by the applicable EPA or Standard Method.

þ	Metal	$\mu$ g/L leaching solution
	As	0.002
	Ba	0.1
	Cd	0.005
	Cr	0.05
	Pb	0.1
	Hg	0.0002
	Se	0.002
	Ag	0.01

<sup>&</sup>lt;sup>C</sup>Find if sample is ignitable at 140 degrees Farenheit or below. If so, it is a hazardous waste, in accordance with 40 crR 261.21.

 $^{\mathbf{d}}$ For soil samples, report results as mg/Kg of dry soil. Report moisture content for each soil sample.

Metal	mg/Kg
Sb	15
Ве	0.2
Cd	2
Cr	4
Cu	3
Pb	20
Ni	8
Ag	4
Tl	20
Zn	1

for Total of 204 includes second column confirmation for 50% of the samples (64).

gTotal of 28 includes second column confirmation for 50% of the samples (9).

hTotal of 64 includes second column confirmation for 50% of the samples (20).

iTotal of 16 includes second column confirmation for 50% of the samples (5).

JTotal of 82 includes second column confirmation for 50% of the samples (26).

\*Total of 28 includes second column confirmation for 50% of the samples (9).

¹Total of 19 includes second column confirmation for 50% of the samples (6).

Total of 98 includes second column confirmation for 50% of the samples (31).

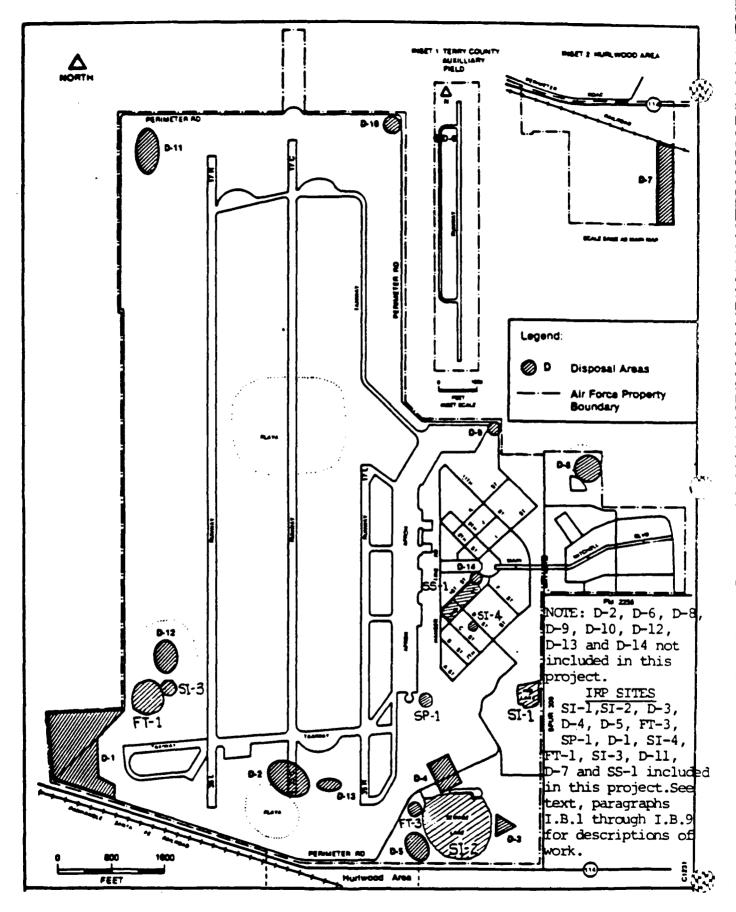


Figure 1 - Locations of IRP Sites, Reese AFB, Lubbock County, Texas

# APPENDIX C WELL/BORING NUMBERING SYSTEM



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	ole C-1 Numbering System	
Site No.	Boring Designation	
001	001 -82 001 -83 001 -W1	
002	002-B1 002-B2 002-B3 002-W1	
003	003-B1 003-B2 003-B3 003-B4	
004	004-81 004-82 004-83 004-W1	ता क च <b>र</b> ग
	005-W1	
005 006	006-81 006-82	
007	007-B1 007-B2 007-B3 007-B4	
900	008-B1	
008	008-82 009-81 to	
009	009-810	
B = Soil boring W = Soil boring co monitoring we	onverted to 11	
		A-24
ı	C-2	
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# APPENDIX D BORING LOGS/MONITORING WELL CONSTRUCTION DIAGRAMS/WELL DATA

D-1



### DRILLING AND SAMPLING LOG

Project Name and Number: <u>Reese AFB IRP · (DF2000)</u>	Well Casing Size and Type: <u>Y" PUC</u>
Site Location: Site 002 - Sewage Care	Screen Size and Type: 4x.012"slot Alc
Boring/Well No.: Oo2-w1	Screened Interval: 170-140
Drilling Contractor: ENVIRONMENTAL DRICCING CORP.	Boring Diameter: 8 % Well Diameter: 4"
Drilling Equipment: Failing 1250- Retary	Date: 8-3-86 Start Time: NA
Driller: Bob Masten Geologist: Michael BEA	UNITE Completion Time: 8-15-86
Oriller's Helper: Rick Reed	
Total Depth of	Hole: 180 Groundwater Depth: 97.67  Gelow top of IVC)

Completion Depth: 180 Surface Elevation: 3294.90

Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
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	TDD #R		701.	DATE:	HOLE DESIGNATION	1:
	HOLE L TOP OF			······	UND ELEV: ASING SIZE AND TY	VDE .
	SCREEN			TECH. MGR:	ASTRO SIZE AND IT	CONTRACTOR:
•				DRILLER/HELPER:	<del></del>	CONTRACTOR.
		_				
1	COMMEN	TS:			<del> </del>	<del></del>
رح)	Dayth N-01cms	SAMPLE	GRAPHIC Coo.	SAMPLE DESCRIPTION		Completion Data
		9042		No Samore 3-47eyelayerace site changing the street -5-Greysile; fine grand, 20%; som	e clay	
10				-10'- Brown sile with clay; Fine gravel, 25%	i-medium	7
		9043		-15-16-Red Brown and tan clay	with some sile ! -	
20				-20'- Tan and realbrown sile wie some fine aroust, 590	ch some clay;	
·				25' Red silts with some c	lay; coarse	
30	<b>-</b>			30'-Red/grey caliche; some of	- ,	
//0				-35'-Red/grey carbonate Cali	1 -	
40				45'-Greysit; trace clay, fire to medium		
50	+	9/83		-50-Tan sand, very fine		22
				_55'-Reddish-tan Sile; some s medium, 5-10%	rand, fine to	
6c,	7			-60'- Pinkmix of silt, clay, i		
				-65-75'- Pink mix of clay sand to fine gravel, 11	with Silt;	
70						
8 <i>0</i>	_			so-muluicoloral coarse and	fine gravel,	
. س	=			-80'- Multicolored coarse and subangular; pinkish clay	ravel to roay so	
90	E			-85-90'- Multick red medium a pe Holes to medium sand; be semi rounded; clay and	sik final	

	SITE N	AME:		SITE I.D: SITE L		ION: 00
	TDD #R		T 0 21 -	DATE: HOLE DESIGNAT	ION:	
	HOLE L			GROUND ELEV:  CASING SIZE AND	TYP	P ·
	SCREEN			TECH. MGR:		CONTRACTO
				DRILLER/HELPER:		
	2212					
	COMMEN	TS:		<del> </del>	7-1	Completi
	,	پر	25.	SAMPLE DESCRIPTION		Data
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70			<b>\</b>		ᆛᆕ	MK
	4			-95' Multicolored medium to coarse sur with some medium gravel semianula to semicourday cooperad se side	시 -	
	-4	}	ł	with some medium groups, semianula	/ -	[ Y ]Y
	_	ł	}	- la semicourded; classed & contin		לו ועו
00	-	1	}	-100'- Multicologed sand to gravel 1/8 or lange	; <del>  </del>	, Y. J. W.
_	-		l	with some clay; sile and Elay Fines	_  -	ע גע
	-	İ		Liver-Town arough mixed with claused sile	_	ו עו
	$\dashv$		ľ	- 105'-Tan gravel mixed with clayard site		א וע
		}	1	The state of the s	1 -	
110	<b>'—</b>	I		-110'-Multicolored sand, fine to coarse; tan	.	
		ļ	1	317 e ana Creation	<b>→</b>	ון וון
	-			-115-15-Tan clay and sift fines; fine to coarse sand, 60%		לו ולו ו
	7	1		to coarse sand, 60%		
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120	-	}	1			/2/ E
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12.	<b>,</b> 🕇	1		120'- To cill - 1 ala Cirri Carda		
130	, —			-130'-Tan sile and clay fines; fine to		
		1		/ / / / / / / / / / / / / / / / / / / /	71 <u> </u>	I N ₹
		1		-135'- Tan clay with some silt; fine some	4	
	コ	j		<u> </u>	┥_	
14	$\neg \Box$	Ì		-140'- Tan Clay with Sile		140
( ~(		1	}	110 - Tark Class some time		
	_		ĺ	-145'- Tan clay with medium sand, 200	: l _	
	4		1	145 -100 Way with medium sans, all	기 _	
	4	1	1	pods of grey blue glay	+-	
Je.	C			-150'- Yellowish clay with, some site;	-	
, ,	~ <del> </del>			-150'- yellowish clay with some silt;	.   —	
	-		1	LIGHT-40/ law class and sile fine to.		
	4			-155/- yellow/tan clay and silt fine to medium sands some pods of graych	<i>4</i>   —	
-	4	1				{
16	0	1		-160'- 40 low tan clay and silt; fine to medium sand, 201%	<b>—</b>	
	-			to medium sand, 201%	-  -	
	-4	}	ļ	-165'- Clay and broken sand Igravel	-	
	-	1	1	1/2 5. /	-	
			1		-   -	170
17	~—	Ì	ı	-170'- Blye grey Clay; fire-medium	$\vdash$	1/0
	-	1	-	<u> </u>	<b>-</b>	
	-		1	-175'- Bluelasey Glan; broken yellon	1-	
	7	1	ł	-175'- Blue grey Glay; groken yellow graves and saind from meets	1	1 []
710	ュヺ	1	1	160'- Blue larey clay; arouse and sand	<b>-</b>	
7 114	U <del></del>					

Project Name and Number: Resse AFB IPP	-(DF2000) Well Casing Size and Type: 4" PVC
Site Location: SITE 005 (Civil ENG	weering Trench Screen Size and Type: 4"x 1012"slet Mc
Boring/Well No.: <u>003-ωι</u>	Screened Interval: 127-97
Drilling Contractor: ENUIRAMENTAL DE	Boring Diameter: 8 % Well Diameter: 4"
Drilling Equipment: Failing 1250-R.	Date: 8-2-86 Start Time: NA
Driller: Bob Masten Geologist	:Dave Palmerten Completion Fine: 18-4-86
Driller's Helper: Rick Reed	
To	tal Depth of Hole: 133 Groundwater Depth: 116.63
Cor	npletion Depth: 133' Surface Elevation: 3318.84

	Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
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			DCAT		GROUND ELEV:			
	TOP	OF	CAS	INC F	LEV; CASING SIZE AND	TYP	E:	
	SCR	EEN	SIZ	E:	TECH. MGR:		CONTRACTOR	:
					DRILLER/HELPER:			<del>-</del>
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	COM	ME N	TS:					
					<del></del>		Completion	
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			9090		3-41-Light brown being chays with seal and Caliche petaller, darkmetics 45 ca. 4-5'-Beige Clays	ng		
				1	45-Beige clays	_	ואין ואין נ	
				<b>!</b>			ו עואו	1
	-			}	-10'-Lightbroum/beige silts and clays, very		וען וען ו	1
10				i i	Coarse sand to very fine callede petales		1 Pol Wi	
		}		1	Coarse Sand B Very Time Course Feature	-	1 Kal Mil	- {
	_		9091	1 1	15-17- Brown leg siles and clays with a few		ויין ויין ויין	1
			ודטדי	•	13-17-Brown 1720 Siles and clays with a few		ע ש	1
	_			,	Pebbles & well-rounded caliches	_	וע ו	}
20					-20'- Recognition serined siles claus pethla 2-800.		ו או אין ד	İ
340				Ì	-20'- Brownfred Stained Silts, Claus, settles 2-8mm,	]	ואן ואן נ	
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					-25- Brown Inch and white Dieces of caliche with			1
			!		315 and Clays, larger pièces & caliche with			1
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40	,	1	1	}	170- White to light brown Carbonare sunas silas			1
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5	<b></b>		\$	ł	50'-Beige dense carponate caliche (and			1
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		ł	1	1	-55'-Caliche carbonate; sand-site with small	$\sqcup$	ון ועז נ	1
		}	1	1	Smoothed, subrounded grey pebbles - land sandstone - no Sandstone sumple taken		ולא ועו ד	
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9	) <del></del>	1	1	1	-60'- Very light brown Caliche carbonate, broken,	<b>-</b>	1 VI I'I	1
	-	ł		1	- Standard Die as	ļ —	1 10 1	
		i		1	colubbia calaba Carlanda Mill Cara			- 1
	_	}	}	1	-65'-White Caliche Carbonate, with few red-rust colored pieces			
	-	ł	1	1		† <sup>1</sup>	1 2 2	]
11	2-	ļ	1	ł	_70'-Small pieces of caliche; very fine			. 1
,	_	i	l	1	-70'- Small pieces of caliche; very fine Sitt-nedium clay	<b>∮</b> ˈ	T B G	}
	_	I	l			1	T BIBS	- 1
	_	1	}	1	-75-Sandy-Siley-Clay light beige-pinkish cast; some small grown Caliche	-	1 점 !	ł
	, —	1	1	1	cast; some small ardund Caliche	]		]
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8	<u>)—</u>	{	Į	Į.	180'- Broken Caliche, Fines; silt and clay	<del></del>		
	-	-	1	1	light brown with pink cast.		시 [첫 [첫]	l
		ł	1	1	15.80 110 av and 60 a a 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1-	4 13 13	1
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a	<u>ہ</u> آ	1	1	Į.				l

SONT TOTAL TO SOUTH SOUTH STATE TO SEE

Durit To

SITE NAME: SITE I.D: SITE LOCATION: TDD #R6-DATE: HOLE DESIGNATION: HOLE LOCATION: GROUND ELEV: TOP OF CASING FLEV; CASING SIZE AND TYPE: TECH. MGR: SCREEN SIZE: CONTRACTOR: DRILLER/HELPER: COMMENTS: Dopth N-0/cms Completion GRAPHIC BAMPLE SAMPLE DESCRIPTION Data mixed with: 100. HID/15'- Gravels and quartz sands, some Fines and clays; quartz sands varied coors mixed in with gravels; gravels lossly comercial 110-120-125-133'-herson & b/he/greyclay; ground-up silica sandir of various colons, sand parocle size 0,5-08mm TD

************	\$ = <b>                                    </b>	=======================================
	acology and environment	inc

### DRILLING AND SAMPLING LOG

Well Casing Size and Type: 4" PJ C
Screen Size and Type: 4x.0123 lot Pvc
Screened Interval: 171-141
Boring Diameter:8% Well Diameter:4*
Date: 7-29-86 Start Time: N/A
completion Fine: 8-1-86
Hole: 176. Groundwater Depth: 103.08
h: 176 Surface Elevation: 3277.75

Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
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					DRILLER/HELPER:			
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	٠,	10	12	2 1	SAMPLE DESCRIPTION	EPTH	Data	١
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	•		,00.		-5-6'-Grey Clay, fine Silts and sames			•
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10	_				10'- Gray fine silts and class; some small	-	<sub> </sub>	
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	-		9022		-15'- Grey fines and clay			/
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	-		1					úl l
30					-20-21- Grey with rust-brown mattle highly plastic fines and clay	47/T		• 1
					righty plastic times and cray	2	V V	<b>'</b>
	-				-25-26- Light arey with some rust colo		I M K	
	_				fines and deay, 31/64			
•				i	-30-31- Grey highly plastic Claus sand 0.1-0.25 mm, off-white, well sorted	,   ¬	M I	'.]
30			9003		01-0.35 mm off-white, well sorted		l U r	7
	_						ן ולו א	1 1
								<u> </u>
				1	11/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2			
	_	•		ļ	38-40-Off-white, some light salt and pepper a Calliche, hard, compact, very fine, well	olor		
40		1		1	cemented compactively time, well		1.4	
		1		1				1
	_	}	<b>\</b>	1	4547-Off-white some salt and pepper color cali hard, compace, fine sand particles, we like semented; some grey and rust; particles	(la) =	ט א	4
		l	1		hard, Compace, fine sand particles, well	_ ارس	M	4
50		I	9024	{	3122 < 0.11 mm.	·		
J(	_	I	'~~'	1	50-51- white chy lens, underlain by have	<b>ℓ</b> 🗔	[ Y ]	4 1
	_	ł	]	1			N N	
	_	<b>.</b>			55-56-white to off-white fine clay high luble	tics -		4 1
	_				55-56-while to off-white fire clay high luples with a few small pleases well-cerustrate ca	Hicke _	<b>   </b>	4 1
ćc	-				-60-71' White Cylay with some		ן נאן זי	1
٠٠	-	]		l	boot white change of		l M	/
	_	1	1	}	rust colored pieces		v   i.	4
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		1	1			_	ע וץ ן	'
	_	1	l	[	-75-76-Brownish-white fire clays with son	ne _		4
	_	1	1	1	rust color.		1 [ ] P	
30	)	1	1		FRANK Commercial Horas Cina of the site will some on	ust	1 [1 L	r
20		-	1	1	80-81-Grey-white very fine clay-silt with some re	-		اار
	_	4	[	[	05-81' Grand CE-white Fine clay mixed with	ر <b>ا</b> ـ		<i>i</i>
	-	4	1	1	-85-86'-Greyloff-white fine clay mixed with quartz peoples of various colors (red, black superismoise) superismoise	4, I-	ן ויין ן	/
	=	ł	1	Ì	Suares Sub rounded to rounded susprismoide	<u>_</u> ==	<b> </b>	/[
a	<b>)</b> —	<u> </u>		<u> </u>	<u> </u>			1

Edding Zeeden Banden Sooms Will

TDD #R6-		DATE: SITE LOCATION: 00 / HOLE DESIGNATION:				
HOLE LOCATION:	GROUND ELEV:					
TOP OF CASING		TYP	E :			
SCREEN SIZE:	TECH. MGR:		CONTRACTOR:			
	DRILLER/HELPER:					
COMMENTS:	<del></del>	-				
Dayth Dayth No- Blews Per 6. Sharle Gaarnic	SAMPLE DESCRIPTION	Детн	Completion Data			
90 13 3	90-95-Red to rust conflomerate, medium pebble quartzinic, well rounded. 95-101'-NO Sample (Fine silty-Clay)		י בי בי כ			
100	ICHOZ-Light Grown Fine siley C/4 4		وددردر			
113	-105-111- Light brown Fine silt-clay with some		33,33,33,33,33,33,33,33,33,33,33,33,33,			
	-115-121'- Light brown fine clay, some arey clay, with a few quartz peobles		119' <b>20</b>			
/30			କ ଶିବିଦ୍ୟୁ ମ			
13)	-130-151'-Light brown very fine clay	1 1 1	126			
140-		1	<i>(41)</i>			
15)						
160	-155-161'- No Sample (very fine clay)					
170	-165-166'-Brown Chy fines mixed with granted quertzitic peoples, 2-3mm, subrounded -170-171'-Blue clay, some small broken up pieces of quertz pebbles		171			
TD 176	-175-176-Brown Clay, Few Small quartzpelseyan	=	47.00			
-		-				

BOOTER TRANSPORT - BEETINGS - KEESSESS -

DRILLING AND SAM	PLING	LOG
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DRIELING AND SAMELING LOG
Project Name and Number: Reces AFB IA - OFZooc) Well Casing Size and Type: 4" PVC
Site Location: Site 004- Southwest LANDFILL Screen Size and Type: 4"x .013's let Pyc
Boring/Well No.: 004-ω1 Screened Interval: 175-185
Drilling Contractor: Sourcommentar Descence Corp Boring Diameter: 8 Well Diameter: V
Drilling Equipment: Failing 1250 - Rotaly Date: 8-5-86 Start Time: N/A
Driller: Bob Masten Geologist: Dave Palmerten Completion Fime: 8-11-86
Oriller's Helper: Rick Road
Total Depth of Hole: 185. Groundwater Depth: 189.19

(Below ter of PUC) Completion Depth: 185 Surface Elevation: 3336.57

Completion
Data\_\_\_\_ Graphic Log Description Remarks Sample N-blows/6"

SITE NAME:			SITE I.D:	SITE LO	CATION:	004
TDD ∲R			DATE:	HOLE DESIGNATI	ON:	
HOLE L				GROUND ELEV:		
TOP OF		_		CASING SIZE AND		
SCREEN	512	<u>E :</u>	DRILLER/HELPER:	GR:	CONT	RACTOR:
<del></del>			DRILLER/RELFER:			
COMMEN	TS:					
7					Com	pletion
3:0	2	3	SAMPLE DESCRI	PTION		Data
£ 100	Samtle	GRAPHI			E01H	1
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				/	- W	M
	Ì	<u> </u>	che proun clay: Fine Sitti Co	ork grey morter	4	I.V
	1	ļ	-5'-Red/brown chys: siles; carbo	on atte pebbles/nadules	- 시 시 시 시 시 시 시 시 시 시 시 시 시 시 시 시 시 시 시	
	1	i .	<del></del>	— — — — — — — — — — — — — — — — — — —		
10 -	}	}	-10'- Rollbrown days; silts,	; broken piecer of	ايرا السا	
-						
4	[		LIST-Brown frod claus, mixed i	with grey class and		
-		l	-15-Brown /red clays, mixed &	ack thips; collocate		, L
7, -	•	Ì	and a 1 Company to the contract of	200///2000/200/200	וא די	
20	ţ		ao'. And fine sands the pieces	: fine silts		V
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	1	1		<del></del>	, V	
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30	1		30-31'- Red/brown Sand	s, silts	L   K_1	ا الم
	1	1	31-32.5-Caliche; brown and will sends	hite preced of sand; siles		
-4	1	}	aind Clays present with sands	GALI PIECEL.		
-4	ļ		caliche pieces, 2-4mm, mixed	with claysandsiles		
-					t-I W	
40		İ	-4245'- white and red/brown	n clays; caliche		
	į .		chips .			Ŭ
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7	ĺ					ן ען
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50				<del></del>		
	1	1		/ ^	_	
	}		-55'-Caliche chips; white c	lays; fines		[٧]
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60-			Consolidated ruse-mote	les coliche; very		
	1		consolidated		L'	ן יין ן
		-	65-70'- Caliche, siltand che pink cast	21-SiZe, With	—   [v	ן און
႕			pink cast	7	v.	
-	1		, .		'	V
70—				:	<b>├</b> ┤	4
7			<del></del>	_ <del></del>	1 - Iv.	4,
-	1	ł	-75'- Ground sand silt	and clay-size;		
• 🗂	1	1	-75'- Ground sand, silt of white with pink cast	- Caliche		
7	1	1	engelishile Caliche land	lu canasal		الأرا
80	1	ŀ	sortwhite Calichy, loose well-ground chip	Sy Cernerister,		
	1	}	1			
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90	1		<u> </u>		<u> </u>	

	SITE NAME:  TDD #R6-  HOLE LOCATION:				SITE I.D:	SITE LOC				
				TON.	DATE:	HOLE DESIGNATIO	N:			
_		TOP OF				GROUND ELEV:  CASING SIZE AND TYPE:				
8		SCREEN			TECH. MGR: CONTRACT					
•					DRILLER/HELPER:		CONTRACTOR.			
		COMMEN	TS:							
		3.		J			Completion			
		7 39	SAMPLE	GRAPHIC	SAMPLE DESCRIPT	rion	E Data			
		2 3	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	33			Data			
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	110		1	Ì		<b>[</b>	00 00			
		<b>_</b>	l							
			l	i	-115' Quartz sands and Gra to Subrounded, various	avel, subanguar				
				}	B subrounded, various	colors				
	120		l		Tag- Fine Gravel and gueste Sa Subangular, various colors	ds, angular to				
	100	J	1	]	Subarquiar, varidus colors	, some Work musted				
٥			1	}	restate in the state of the	1 ca Actors				
-		4	l	•	-125' Chays mixed with sands pieces, various colors	and someseer	ا ا کورا			
		- → '	1			<del>,                                    </del>				
	130	_	<u> </u>	i	130'-60% grey sands tone ch	ips with musterd				
	, -	4	1		colored scioniana pebbles	resands of barrows				
		4	j	1	-135- Large 8-15mm Rebbl mostly quartz, angular to some fine clays with a	ed & various gates				
			ĺ		mosely quartz, anaulayto	subrounded;				
		-		ŀ	Some that class washed	5: pebbles of various				
	140	-	{	1	- Mo' Brown Clark and fine Sil - Mo' colors mirely in 20%, pebb subrounded, 10-12 mm in Si	les subangulan to -				
		-	1	l	subrounded, 10-12 mm in Si	12e.				
		$\dashv$	1	1	145! Fine silts and clays various colors, 8-10mm	; some people of	145			
		-	ì	1	Various colors, 8-10MM	111 3122				
	<i></i>	7	1		150'- Brown clays and fine					
	150	7	1	1	1150- STOWN CLOUS and The	m in Size	一 同 日 1			
		7	1		very fine pebbles 3-3m	C'/1				
		7			155' Brown clays and fine s su bangular and subpri	115, 19-30 to pebbles	一 13 13 1			
			1	1	su banqular and subpri	SMOIGW, 6-10MM				
	1	n	İ		LEN' BOWLE SILES DE BHOA OF	black and various				
	/ <		1		Golors, angular, to subant Size, most pebbles are	quar 26mm in				
					Size most pebbles are 9	1252				
				1	sand and fine pebble	M - A / F- C / M/ML	] 165			
		1		}		II.				
	170		1	1	-Po-Light brown claus, S	ipme 15% Fine L				
	1,0				-170-Light brown clays, siles; fire quartz per	sker				
1,747		4			no variety of colors (h	rowns, reds, whites!				
		4	1	1	175- Sand-strad culting siles and clays	, some brown .	175			
		=			- siles and clours	<del>-</del>				
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gesses established between the second between the second

	SITE NAME: TDD #R6-				SITE I.D: SITE LO	CAT	ion: 004
				TAN .	DATE: HOLE DESIGNATI	ON:	
	TOP		CAS	ION:	GROUND ELEV:		
	SCRI	EEN	SIZ	E:	LEV; CASING SIZE AND TECH. MGR:	TYP	
					DRILLER/HELPER:		CONTRACTOR:
	COM	MEN.	rs:				
	1 1	¥.		ر	GAMPIE POGGOTOMION		Completion
	12	3	16	2	SAMPLE DESCRIPTION	3	Data
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/80	भूर				185'- Beige Clays		N E
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Project Name and Number: Rese AFB-IRP (DF-2000) Well Casing Size and Type: NA
Site Location: Site 008 Alakood Screen Size and Type: NA
Boring/Well No.: 008-132 . Screened Interval: 1/4
Drilling Contractor: Environmental Drilling Co. Boring Diameter: 6" Well Diameter: 11
Drilling Equipment: Mobil B-53 - Hollow stem auger Date: 8-12-86 Start Time: 12:51
Driller: Bobby Knoof Geologist: Mike Benner Completion Time: 14:36
Driller's Helper: Eddie Chandler
Total Depth of Hole: $18.5$ Groundwater Depth: $18.5$
Completion Depth: NA Surface Elevation: 33/434

	Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
đ	10-2.5	9108	11-010#370	Log	2404	1.0-1.6 Fill	0-1.0 Augered
	-					1-6-2.5 Brown dry silt	
	5.0- <u>1.5</u> - -		4-4-4			5.0-6.5 Redand brown dry powdery silt,	
	10.0 <u>- 11</u> .5 - -		5-16-24			10.0-11.5 Ton silt with some white pods some block.	
	- 15.0 = 14.5	9/09	21-41-55			15.0-16.5 Red/brown very tight silt with white silt pads,	
	17.0-18.5	9110	17-27-46			17.0-18.5 Same as above with some red/brown clay at 18.1-18.3.	Auger refusal at 17.0',
	-						
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### DRILLING AND SAMPLING LOG

Project Name and Number: Reese AFB-IRP (DF-2000)	Well Casing Size and Type: NA
Site Location: 5, += 008 Aurlwood	Screen Size and Type: <u>NA</u>
Boring/Well No.:	Screened Interval: NA
Drilling Contractor: Environmental Drilling Co.	Boring Diameter: 6" Well Diameter: NA
Drilling Equipment: Mobile B-53 - Hollow stem auger	Date: 8-12-86 Start Time: 09:00
Driller: Bobby Knopf Geologist: Mike Benn	
Driller's Helper: Eddie Chandler	

Total Depth of Hole: 25.5 Groundwater Depth: NA Completion Depth: NA Surface Elevation: 330650

Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
1.0-2.5	(9105) 9139)	2-6-7 2-5-4		NA	1.0-2-5 Block/brown silt 100m. 1.5-4.0 Some as above.	0-1.0 Augered
5.0-625	_	8-19-21			5.0-5.4 Block/brown sitt loam. 5.4-6.5 Dark gray dry silt.	
- 100-11.5 -		3-10-18			10.0-11.5 Green/gray stiff clay with trace of sitt.	
-  5.0-]&5  -  -	9106	7-17-23			15.0-15.6 Green/gray clay with some silt, stiff, 15.6-16.5 Green/gray silt with some clay, mottled, stiff.	
- 20.0 <u>-</u> 21.5 -		4-14-19			20.0-21.5 Gray/green clay with some silt, stiff, sand pod - 20.0-20.2.	
- - 24.0 <u>-</u> 25.5 - - -	9107	7-24-50			24.0-24.7 Groy/green cloy, stiff. 24.7-25.0 Stained groy/green silt with some clay. 25.0-25.6 Groy/green very tight dry silt.	Augers would not penetrate been 24 feet due to heavy clay.
						,

### DRILLING AND SAMPLING LOG

BRILLING AND SAM	LING LOG		
Project Name and Number: Reese AF8-IRP(DF-2000)	Well Casing Size and Type: <u>NA</u>		
Site Location: S: +E007	Screen Size and Type: NA		
Boring/Well No.: 007-134	Screened Interval: //A		
Orilling Contractor: Environmental Drilling Co.	Boring Diameter: $\underline{4}''$ Well Diameter: $\underline{\mathcal{MA}}$		
Drilling Equipment: Mobile - B-53 - Hollow stem auger	Date: 8-5-86 Start Time: 15:31		
Driller: Bobby Knopf Geologist: Mike Ben	Completion Time: 16:30		
Oriller's Helper: Eddie Chandler			
Total Depth of	Hole: $28.5^{\prime}$ Groundwater Depth: $\Lambda/\Delta$		

Completion Depth: <u>NA</u> Surface Elevation: 3331.64

Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
5.0-4.5	9/02	7-10-11			5.0-5-8 Grove   fill, asphalt, at top soil.  5.8-6.5 Groy silt	OVA -1-2ppm
10.0 = 11.5 -		4-21-25			10.0-11.5 White Han dry silt.	0YA - 0
- 15.0=16.5 - -	9/03	6-27-45			15.0-16.0 Brown tight silt. 16.0-16.2 Gray silt. 16.2-16.5 Brown tight silt with some 1/2"gravel.	OVA-0
20.0=21.5		9-23-34			20.0-20.4 Fill, asphalt, dark brown 5ilt, trace clay, 20.4-21.5 Tan silt, 5% 1/6" gravel.	0 VA - 0
15.0-25.5 18.6-18.5	} (9104 ) (9138)	II- 45 (3 ")			25.0-25.5 Gray/brown fine sand. 28.0-28.5 Tan fine sand with	

Project Name and Number: Reese AFB-IRP(DF-2000)	Well Casing Size and Type: <u>NA</u>
Site Location: S:+= 007	Screen Size and Type: NA
Boring/Well No.:	Screened Interval: NA
Orilling Contractor: Environmental Drilling Co.	Boring Diameter: 6" Well Diameter: MA
Drilling Equipment: Mobile B-53 - Hollow stem auger	
Driller: Bobby Knopf Geologist: Hike Ben	
Driller's Helper: Eddie Chandler	
	Hole: 31.5 Groundwater Depth: NA
. Completion Dept	h: NA Surface Elevation: 3332.27

Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
1.0-2.5		6-7-15			1.0-1.2 Black/brown silt loam.	0-1-0 Augered
5.0 - Lub	9 099	8-/7-27	·		1.2-2.1 Asphaltic fill grovel. 2.1-2.5 Brown dry silt. 5.0-5.4 Brown silt 5.4-6.5 Tan/brown dry silt.	OVA -O
100- <u>115</u>	·	11-8-16			10.0-10.8 Tan/white tight dry 51tt, 10.8-11.5 Brown tight dry silt.	
15.0 = 16.5 - -	9100	13-13-18			15.0° 15.4 Medium brown silt. 15.4-16.5 White and brown/tan dry silt.	
- 20.0 <u>-21</u> .5 - -		17-19-25			20.0-20.4 Brown/ton silt. 20.4-20.9 White and ton silt. 20.9-21.5 Tan tight dry silt.	·
- 25.0-34.5 -		19-16-25			25.0-25.4 White / tan silt. 25.4-25.8 Brown silt 25.8-26.5 Tan very fine sand,	
30.0-31.5	9 101	11 - 23-43 (5°)			30.0-31.2 Brown fine sand. 31.2-31.5 Brown very tight dry silt.	

### DRILLING AND SAMPLING LOG

Project Name and Number: Reese AFB-IRP (DF-2000)	Well Casing Size and Type: <u>NA</u>
Site Location: $5 + \epsilon 007$	Screen Size and Type:
Boring/Well No.: 007-B2	Screened Interval:
Drilling Contractor: Environmental Drilling Co.	Boring Diameter: <u>// Well Diameter: /// </u>
Drilling Equipment: Mahile B-53- Hollow stem ancon	Date:8-5-86 Start Time: /0:29
Driller: Bobby Knowf Geologist: Mike Be	nner Completion Time: 12:31
Driller: Bobby Knopf Geologist: Mike Be Driller's Helper: Eddie Chondler	
	Hole: 31.5 Groundwater Depth: NA

Completion Depth: NA Surface Elevation: 3329.64

	Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
đ	10-7-5		4-7-9			1.0-1.7 Dark brown silt loom. 1.7-2.5 Brown dry silt.	0-1.0 Augered  044 - 0
	5.0 -6.5 - -	9096	7-17-22			5.0-5.7 Brown dry silt. 5.7-6.2 Brown/white silt. 6.2-6.5 Red/brown dry tight	OVA - 0
	- 10.0 <u>-</u> U.5 -		9-20 <b>-50</b> (5°)		·	10.0-11.0 Brown / tan dry tight silt 11.0-11.3 Red/brown silt. 11.3-11.4 Brown silt with 1/6"	OVA-0
	- 15.0-14.5 -	9097	16-34-50(4*)			grovel, very tight. 15.0-15.8 Brown silt. 15.8-16.1 Gray flaggy silt. 16.1-16.4 Tan tight silt.	OVA - O
	20.0 - 21.45 - -		16-34-52			20.0-21.5 White and tan very tight dry silf.	0VA +0
4	25.0 = 24.5		16-24-24			25.0-26.5 White/brown tight dry silt.	
	30.0-31.5	9098	21-33-50(5")			30.0-31.5 Red/brown dry silt.	OVA -0

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Project Name and Number: Reese AFB-IRP(DF-2000)	Well Casing Size and Type: NA
	Screen Size and Type: NA
Boring/Well No.: 007 - 131	Screened Interval: NA
Drilling Contractor: Environmental Drilling Co.	Boring Diameter: 6" Well Diameter: MA
Drilling Equipment: Mobile B-53 - Hollow stem auger	
Driller: Bobby Knopf Geologist: Mike Be,	
Driller's Helper: Eddic Chandler	
Total Depth of	Hole: 18.5 Groundwater Depth: NA
Completion Dept	h: <u>NA</u> Surface Elevation: <b>33.29./6</b>

Depth	Sample	N-hlows /5"	Graphic Log	Completion Data	Description	Remarks
	Sample	_	Log	Data	<del></del>	
1.0 - 2.5		3-6-12			1.0-1.8 Black brown sitt loom	0-1.0 Augered.
					top soil.	
					1.8-2.5 Brown dry silt.	OYA-O
5.0 = 6.5	9093	5-10-20			5.0-5.4 Dark brown sitt trace clay.	
	, , ,	70 20			5.4-5.9 Brown tight dry silt.	
_					5013 WHI 1-111 1111 11	
-					5.9-6.3 White reddich tight dry silt	OYA-O
-					6.3-6.5 Brown tight dry silt.	
10.0=11.5		9-27-45			10.0-11.5 Tan reddish tan	
-					tight dry silt.	
-					/'gh' y 3///.	
-						
15.0 - 16.5	9094	12-17-30			15.0-15.8 Same as above.	
15.0 - 10.7	7011	/ / / / 30			l .	0M-0
-					15.8-16.5 Red/brown tight dry silt.	
-					~. <i>y 3///</i> .	
17.0 - 18.5	9095	5-27-50(3")			17.0-18.5 Brown very test silt	0VA-0
	,0,5				17.0-18.5 Brown very tight silt,	Auger penetralion
						stopped at 17.
						Too hard.
			ĺ			100 NAPH.
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DRILLING AND SAMPLING LOG
Project Name and Number: Reese AFB-IRP (DF-2000) Well Casing Size and Type: NA
Site Location: Site ooi - Tabustain lara Screen Size and Type: NA
Boring/Well No.: _001-81 1 Screened Interval: NA
Drilling Contractor: Environmental Drilling Co. Boring Diameter: 6" Well Diameter: NA
Drilling Equipment: Mobile B-53 - Hollow stem organ Date: 7-30-86 Start Time: 11:48
Driller: Bobby Knopf Geologist: Mike Benner Completion Time: 15:00
Oriller's Helper: Eddie Chandler
Total Depth of Hole: $30.0^{\circ}$ Groundwater Depth: $10.0^{\circ}$
Completion Depth: NA Surface Elevation: 3300./4

	Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
6	1.0 -2.5		4-4-5		NA	1.0-2.5 Black-dark gray silty Clay loom	0-1.0 Augered
	- 5.06.5 - -	9012	3-4-6			5.0-5.4 Gray-brown siltly loam 5.4-6.5 Gray-brown clay, trace silt, dry	OVA - 0
	- 14011.5 - -		4-6-10			10.0-11.5 Gray-green mottled clay, tight-stiff.	OVA - O
	- 15.016.5 - -	9013	4-6-9			15.0-15.25 Gray-green tight stiff Clay. 15.25-16.1 Gray-green dry silt. 16.1-16.2 Fine silt, trace tan fine sand.	0VA – 0
	- 20.0 = -21.5 - - -		4-9-15			fine sand. 16-2-16-5 Groy-green dry silt. 20-0-20-8 Groy dry stiff clay. 20-8-21-5 Light groy stiff clay to silt, some mottling.	
	- 15.0 - <b>34</b> .5 - 27.0 <b>.28</b> .5		6-16-19			25.0-25.1 Black-groy tight clay. 25.1-25.3 Gray-green tight clay. 25.3-25.5 Fine sand with clay.	OVA - 0
<b>8</b>	- 285 -306 	(9014) (914)	5-10-16	·		25.6-25.6 Brown fine send mithely 25.6-26.5 Fine light gray tight dry sand. 27.0-30.0 Fine light gray sand, brown-crange staining.	,

Project Name and Number: Reese AFB-IRP (DF-2000)	Well Casing Size and Type: NA
Site Location: Site 006. FRE TRAINING AREA	Screen Size and Type: NA
Boring/Well No.: 006-B2	Screened Interval: NA
Orilling Contractor: Environmental Drilling Co.	Boring Diameter: 6 Well Diameter: 1/1
Drilling Equipment: Mabile B-53 - Hollow stem anger	
Driller: Bobby Knopf Geologist: Mike Ben	Completion Time: 17:40
Driller's Helper: Eddie Chandler	
Total Depth of	Hole: 23.5 Groundwater Depth: ,UA
Completion Dept	h: NA Surface Elevation:33/0.91

Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
-				•	Hole more (3) times due to construction debris.	
5-0-65	9053	6-3-3			5.0-6.0 Fill silt lam, bricks, gravel. 6.0-6.5 Very dry powdery silt	
100- <u>11</u> .5		13-33-60			10.0-10.4 Black dry silt 10.4-11.5 White with green tint 5ilt, very tight, dry.	
15.0 - 16.0	9054	20-70			15.0-16.0 White tight dry sitt-	
20.0 21.5	9055	21-43-50(5")			20.0-20.7 White dry silt. 20.7-21.5 Gray/pink/white dry silt-	
23.52		17-21			23.5 No sample recovered	235' Rofusa/
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### DRILLING AND SAMPLING LOG

Project Name and Number: Reese AFB-IRP (DF-2000)	Well Casing Size and Type: <u>NA</u>
Site Location: S: +2006 Fire TRIANING AREA	Screen Size and Type: NA
Boring/Well No.:	Screened Interval: NA
Drilling Contractor: Environmental Drilling Co.	Boring Diameter: <u>4"</u> Well Diameter: <u>M</u>
Drilling Equipment: Mobile 15-53-Hollow stem auger	
Driller: Bobby Knopf Geologist: Mike Ben	ner Completion Time: 13:40
Driller's Helper: Eddie Chendler	

Total Depth of Hole: 26-5 Groundwater Depth: NA

Completion Depth: <u>NA</u> Surface Elevation: <u>33/1.74</u>

	Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
G	1.0- <u>7.</u> 5		3-6-9			1.0-1.8 Block/brown silt loam 1.8-2.5 Brown dry silt.	0-1-0 Augered
	5.0=6.5 - -	9049	5-30-39			5.0-5.3 Brown dry silt. 5.3-6.5 White dry silt.	
	10D-JL5 -	;	6-18-37			10.0-10.6 White dry silt.	
	13.0 - 14.5 14.5 - 14.0 -	2/9050 S(9144)	9-43-50(3") 11-40-50(2")			13.0-13.8 Green/brown sitt. 13.8-14.5 Weathered stained white 5/11 with red/brown pods. 14.5-16.0 Same as above.	
	20-0-21-5 - - -	9051				20.0-20.8 Weathered silt, some staining. 20.8-21.2 Brown/tan very fine 21.2-21.5 Tan silt.	·
Ş	25,0 <u>-</u> 26.5 14.5 - <del>1</del> 6.6	9052	6-16-26 50(1")				Auger penetration stopped at 26.5'. Too hard.

#### DOTLLING AND SAMPLING LOC

UKILLING AND SAMPLI	ING LUG
Project Name and Number: Rease AFB-IRP (DF-2000)	Well Casing Size and Type:_ <i>NA</i>
Site Location: 5:42004 LANGEII 5	Screen Size and Type:
Boring/Well No.: 004-B3	Screened Interval: NA
Prilling Contractor: Faviran mental Prilling Co.	Boring Diameter: <u>6</u> Well Diameter: <u>NA</u>
Drilling Equipment: Mabile 13-53-Hollow stem ager	
Driller: Bobby Knopf Geologist: Mike Benne	
Driller's Helper: Eddie Chandler	
	ole:31.5 Groundwater Depth: NA
- Completion Depth	: NA Surface Elevation: 3331.72

Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
1.0 -7.5		4-9-10		NA	10-2.5 Sitt/clay fill, very dry	0-1.0 Augered OVA -0
5.0-L.5 - -	9081	7-10-8			5.0-6.5 Red-brown tight dry silt/clay fill.	OVA - O
- /•.0 <u>-[</u> ].5 - -		6-7-11			10.0-11.5 Red-brown tight silt/clay with some white/gray pods	OVA - 0
- 15.0 <u>-</u> 16.5 -	9082	17-30-54			15.0-16.5 Light brown clay with some silf, streak of white dry fine powdery silt.	OVA-0
20.0- <u>71</u> .5 -		17-24-32		•	20.0-21.5 Same is above.	OVA -0
- 25.0-26.6 - -		16-28-59			25.0-25.7 Same as above 25.7-26.5 Dry Caliche.	
- 30.0-3 <u>1</u> .5	(90 <b>1</b> 3)	17-21-27			30.0-30.6 Caliche 30.6-31.5 Caliche with light brown-red dry clay.	OVA-1402 ppn

### DRILLING AND SAMPLING LOG

<b></b>	
Project Name and Number: Reese AFB-IRP(DF-2000)	Well Casing Size and Type: NA
Site Location: 5: 1= 004- LANdf:11	Screen Size and Type: NA
Boring/Well No.: 004-B2	Screened Interval: NA
Orilling Contractor: Environmenta / Drilling Ca.	Boring Diameter. 6 Well Diameter: MA
Drilling Equipment: Mobile B-53 -Hollow stem ange	Date: 8-/-86 Start Time: 16-21
Driller: Bobby Knopf Geologist: Mike Ben	Completion Time: 10:76 8-2-86
Driller's Helper: Eddie Chandler	
Total Denth of	Hole: 21.0 Groundwater Depth: NJA

Total Depth of Hole: 21.0 Groundwater Depth: NA

Completion Depth: NA Surface Elevation: 333aQ

Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
0 7.5		5-9-10		NA	1.0-2.5 Park brown silt	0-1.0 Augere. 0VA - 0
5.0-4.5	9078	8-10-12			5.0-5.9 Brown silt 5.9-6.5 Red-brown tight compact silt	0 VA - 0
- - - -		11-14-12			10.0-11.5 Park brown silt with white silt pods, dry, tight.	
15.014.5 - -	9079	13-22-27			15.0-165 Brown / gray tight dry compact silt.	OVA - O
19.5 <u>7</u> 1.0	9080	7-8-13			19.5-21.0 Brown dry tight silt with pods of white silt.	19.5 Augers a not drill any deeper, Too hord.
<b>.</b>						

Project Name and Number: <u>Rese AFB-IRP(DF-2000)</u>	Well Casing Size and Type: <u>NA</u>
Site Location: 5; to 004 Landfill	Screen Size and Type: NA
Boring/Well No.: 604-13 1	Screened Interval:
Orilling Contractor: Environmenta   Drilling Co.	Boring Diameter: // Well Diameter: MA
Drilling Equipment: Mobile B-53 Hollow stem anger	
Driller: Bobby Knapf Geologist: Mike Ben	
Oriller's Helper: Eddie Chandler	
Total Depth of	Hole: 31-5 Groundwater Depth: NA
Completion Dept	h: NA Surface Elevation: 3331.49

Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
1.0 2.5 - -	9075	6-10-14			1.0-2.5 Brown sitt with	0-1.0 Augered OVA-0
5.0 <u>-</u> 4.5 - -		2-5-6			5.0-6.0 Dark brown clay with some silt. 6.0-6.5 Light tan dry compact silt.	
- 10.0 <u>-</u> 10.0 <u>-</u> -		10 -21-34				
- 15.0 - 16.5 - -	9074	15-30-50			150-16.5 Ton-brown silt with trace clay & callishe peds.	OVA -0
200 - 1/5		15-25-24			20.0-20.4 Tan-brown dry tight dry silt. 20.4-20.6 Weathered Coliche. 20.6-21.5 Tan-brown do ticht	·
25.0 <del>-</del> 26.5		7-19-23			20.6-21.5 Tan-prown dry tight Silt. 25.0-26.5 Brown tight dry cilt	
30.0-21.5	9077	15-25-38			30.0-30.6 Red-brown tight dry silt.	

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Project Name and Number: Reese AFB-IRP(DF-2000)	Well Casing Size and Type: <u>////</u>
Site Location: S.F. 003 POL AREA	Screen Size and Type:
Boring/Well No.: 003-134	Screened Interval: <u>NA</u>
Orilling Contractor: Environmental Dilling Co.	Boring Diameter: 4' Well Diameter: MA
Orilling Equipment: Mobile B-53 - Hollow stem auger	Date: 8-3-86 Start Time: 15.00
Driller: Bobby Knowf Geologist: Mike Ben	Completion Time: 16:16
Oriller's Helper: Eddie Chandler	
Total Depth of I	Hole: 20.7 ' Groundwater Depth: NA
Completion Dept	n: MA Surface Elevation: 3327.35

	Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
d	P 72.5		5-12-13			1.0-2.5 Brown silt loam.	0-1.0 Augered
	- 5.0 - 4.5 - -	9069	8-36-40			50-6.5 Brown tight dry silt.	OVA - 1 ppm
	-  0.0JI.5  -  -	9070	18-71			10.0-10.5 Brown silt. 10.5- Caliche	OVA - O
	- 15.0 <u>-</u> 16.5 - -	9071	45-75(3^)			15.0-15.8 Brown very tight dry silt, with pods of white silt (caliche).	OVA - O
	- 20.0 <b>- 2</b> 16 - - -		27-50(2½°)			20.0-20.7 Brown/gray very tight silt.	Auger penetration stopped at 20'. Too hard.

Project Name and Number: Reese AFB-IRP (DF-2000)	Well Casing Size and Type: <u>NA</u>
Site Location: 5: +2 003 DOL AREA	Screen Size and Type: NA
Boring/Well No.: 003-73-3	Screened Interval: NA
Orilling Contractor: Environmental Drilling Co.	Boring Diameter: $\underline{\underline{6}''}$ Well Diameter: $\underline{\underline{MA}}$
Drilling Equipment: Mobile B-53 - Hollow stem auger	Date: 8-3-86 Start Time: 12:34
Driller: Bobby Knowf Geologist: Mike Be.	Completion Time: 14:05
Oriller's Helper: Eddie Chandler	
Total Depth of i	Hole: 190' Groundwater Depth: NA
Completion Depth	n: NA Surface Elevation: 3326.97

Depth	Samp1e	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
1.0 - 3.5		3-5-6			1-0-1.7 Black brown clay with some silt,	0-1.0 Augere, OVA -0
5.0 -4.5	9065	3-5-7			1.7-2.5 Brown/red sill trace clay 5.0-5.3 Dark brown block clay with some silt.	
•					5.3-6.5 Tan/white dry powdery silt.	
10.0 = 4.5	9066	2-6-14			10.0-10.4 Black/brown tight silt with some tanswhite tight silty clay.	
V5.0-14.5	9067	15-30-42			10.6-11.5 Brown bal ticht silt.	
17.5 - 19.0	9068	16-17-19			15.0-15.2 Gray stiff clay, 15.1-16.0 Red very tight silt with trace of clay, 16.0-16.5 Red silt with trace of clay and grovel up to 1/8",	Auger penetration stopped at 17.5',
					18.2-19.0 Red/brown dry tight	
- -					silt,	
-						

### DRILLING AND SAMPLING LOG

Project Name and Number: Reese AFB-IRP(DF-2000) We	Mell Casing Size and Type: NA
Site Location: 5: 12:003 POL AREA SO	creen Size and Type:
Boring/Well No.: 003- B2 Se	creened Interval: NA
urilling Contractor: Environmental Drilling Co. Be	Boring Diameter: <u>6</u> Well Diameter: <u>Wa</u>
Drilling Equipment: Mobile B-53 - Hollow stem auger D	Date: 8-3-86 Start Time: 09:55
Driller: Bobby Knepf Geologist: Mike Benn	Completion Time: //:57
Driller's Helper: Eddie Chandler	
Total Depth of Ho	ole: 28.5 Groundwater Depth: NA

Completion Depth: NA Surface Elevation: 3327.06

Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
0 2.5		2-3-5		NA	10-25 Dark brown silf with trace of clay	0-1.0 Augered 04-0
5.0 = 4.5	9061	3-3-5	·		5.0-5.3 Dark brown silt. 5.3-5.9 Mixed dark brown silt and tan dry silt with white silt pods	OVA - 0
- 10.0-4.5 -	9062	-			5.9-6.5 Tan dry silt with white silt pods.	01/4
- 150 - Jb.S - -	9063	6-15-23			15.0-16.0 Same as above. 16.0-16.2 White/gray trekt day silt	044 - 0 04 - 0
20.0 <u>-</u> 21.5 - - -	9064	3-27-14			20.0-20.2 Brown tight stiff clay. 20.2-20.3 White silt. 20.3-21.2 Brown dry silt. 21.2-21.5 White silt.	OVA-O
250 - 24.5 J.0 - 28.5	291434 59150	14-16-18 6-9-12			25.0-25.3 Brown stiff clay. 25.3-26.1 Caliche 26.1-26.5 Brown tight silt. 27.0-28.5 Red brown and tan tight silt.	Auger penetration stopped at 27'. Too hard.
	5.0 = 4.5 	5.0 = 6.5 - - - - -	5.0=4.5 9061 3-3-5 	Depth Sample N-blows/6" Log.  1.0 2.5	Depth Sample N-blows/6" Log Data  10.0 2.5  15.0 = 4.5  9061  3-3-5  15.0 = 4.5  9063  4-15-23  20.0 = 21.5  9064  3-27-14  25.0 = 24.5  91434	Depth Sample N-blows/6" Log. Data Description  10.25 Dark brown silt with trace of clay  5.0-6.5 Dark brown silt with silt silt pods.  5.0-6.5 Dark brown silt with white silt pods.  10.0-11.5 Brown silt with tan silt pods.  15.0-16.5 Brown silt with tan silt pods.  15.0-16.5 Brown silt with tan silt pods.  15.0-16.5 Brown silt with tan silt pods.  15.0-16.5 Brown silt with tan silt pods.  15.0-16.5 Brown silt with tan silt pods.  15.0-16.5 Brown silt silt clay.  20.0-20.2 Brown tight stiff clay.  20.0-20.2 Brown dry silt.  20.0-20.3 White silt.  25.0-26.5 Brown stiff clay.  25.0-26.5 Brown stiff clay.  25.0-26.5 Brown stiff clay.  25.0-26.5 Brown stiff clay.  25.0-26.5 Brown stiff clay.

#### DRILLING AND SAMPLING LOG

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Project Name and Number: Rese AFB - TRP (DF-2000)	Well Casing Size and Type: NA
Site Location: S: +=003 - POL AREA	Screen Size and Type: NA
Boring/Well No.: 003-B 1	Screened Interval: NA
Drilling Contractor: Environmental Drilling Co.	Boring Diameter: 6" Well Diameter: NA
Drilling Equipment: Mobile B-53-Hollow stem auger	Date: 8-3-86 Start Time: 07:30
Driller: 3, by Knopf Geologist: Mike D	Renner Completion Time: 09:24
Driller's Helper: Eddie Chandler	
Total Nepth of i	Hole: /9.5 Groundwater Denth: 1/1

Completion Depth: NA Surface Elevation: 3328.67

Graphic Completion Depth Sample N-blows/6" Data Log Description Remarks 0-1.0 Augered 2.5 1.0-2.5 Brown dry silt. 4-4-5 NA OVA -O 5.0 -4.5 9057 OVA - 3 mgm 5.0-5.7 Dark brown silt 5.7-6-3 Tan dry silt. 6.3-6.5 White dry silt. 10.0-11.5 9058 17-23-32 10.0-11.5 Light tan silt with some white silt pods. CVA - O 15.0--16.5 9059 18-27-31 15.0 - 16.5 Same or above. OVA- 3 ppm 21-28-45 9060 17.0-195 Red/brown very 29-50-50(3") Augers would tight silt with white dry not penetrate silt pods. been 17 feet.

### DRILLING AND SAMPLING LOG

Project Name and Number: Rese AFB-IRP (DF-2000) Well Casing Size and Type: NA
Site Location: Site 002 SEWAE LAKE Screen Size and Type: NA
Boring/Well No.: 002-133 Screened Interval: NA
Drilling Contractor: Environmental Drilling Co. Boring Diameter: 44 Well Diameter: NA
Drilling Equipment: Mobile B-53-Hollow stem auger Date: 7-31-86 Start Time: 14:05
Driller: Bobby Knopf Geologist: Mike Benner Completion Time: 15:42
Driller's Helper: Eddic Chandler

Total Depth of Hole: 20.5 Groundwater Depth: NA

Completion Depth: NA Surface Elevation: 3293.76

	Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
Ğ	.0 2.5	9039	2-2-5		NA	1.0-1.3 Loose top soil 1.3-25 Black-groy tight stiff dry clay	0-1-0 Augered  OVA - 0
	5.0 <b>- 4.</b> 5 - -					5-0-6-2 Black-gray tight clay 6-2-6-5 White-tan tight dry powdery silt with some clay.	ova - 0
	/0.0- <i>11.5</i> - - -		3-11-23			10.0-10.6 White-gray tight stiff clay, 10.6-11.5 Red, pink & gray silt and very fine sand, dry tight.	OVA - O
	15.016.5 - - -	9040	6-36-54			15.0-16.5 Red, pink & groy silt and very fine sand, dry tight.	OVA -0
	20.0 <b>-</b> 20.5 - -		8-50(42")			I .	Auger would not drill been 20 feet. Too
							hard.

### DRILLING AND SAMPLING LOG

***************************************	
Project Name and Number: Ress AFB-IRP	DF-2000) Well Casing Size and Type: NA
Site Location: 5. to ooa Seware 1	Screen Size and Type: NA
Boring/Well No.: 002-B2	Screened Interval: NA
Prilling Contractor: Environmenta   Drilling	Co. Boring Diameter: 6" Well Diameter: WA
Drilling Equipment: Mobile 13-53-Hollow ste	m auger Date: 7-3/-86 Start Time: //:/b
Driller: Boby Knopf Geologist:	Mike Benner Completion Time: 13:12
Driller's Helper: Eddie Chandler	
Total	Depth of Hole: $20 \le$ Groundwater Depth: $\frac{1}{20} \le$

Completion Depth: NA Surface Elevation: 3294.08

Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
2.5	9034	2-2-5		NA	1-0-1-8 Black tight clay. 1-8-25 Black-gray tight clay.	0-1.0 Augered 0VA - 0
-		2-4-6			5.0-5.7 Black tight dry clay. 5.7-6.5 White-tan dry powdery silt.	OVA -O
10.0 - 11.5 -		6-20-30			100-11.5 White-tan stained dry tight silt, very hard.	
- 5.016.5 -	9037	5-15- 30			15.0-15.5 White tan stained dry silti 15.5-16.5 Very fine tight tan	OVA - 0
- 20.5 	903 <b>8</b>	5-20-50		·	Silty sand, some staining.  19.0-19.4 Very fine tight white- tan silt with some very fine sand.  19.4-20.5 Tan-pink stained dry tight silt with some very fine sand.	Augers would not drill be on 21 feet. Too hord.
-						

URILLING AND SAMP	LING LUG
Project Name and Number: Reese AFB: IRP(DF-2000)	Well Casing Size and Type: <u>NA</u>
Site Location: S: to OOD SEWAGE LAKE	Screen Size and Type: NA
Boring/Well No.: 002-B/	Screened Interval: NA
Drilling Contractor: Environmental Drilling Co.	Boring Diameter: 6 Well Diameter: 11
Drilling Equipment: Mobile B-53-Hollow stem auger	Date: 7-3/-86 Start Time: 08:30
Driller: Bibby Knopf Geologist: 11/ke Ben	ner Completion Time:
Driller's Helper: Eddie Chondler	
Total Depth of	Hole: 2/.0 Groundwater Depth: NA
Completion Dept	h: <u>NA</u> Surface-Elevation: <u>3298.5</u> 2

	Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
	1.0 3.5		5-6-8		NA	1.0-2-5 Top soil, fill dist.	0-1.0 Augered
	- 5.06.5 - -	9033	7-12-10			5.0-5.5 Fi'll 5.5-6.5 Dry silt with clay loam.	OVA - 0
	10.0_41.5 - - -		8-10-20			10.0-10.7 Dry black-brown 511t loom. 10.7-11.5 Dry white compact lime silt.	OVA - O
	- 15-0 - 16-5 - -	9034	10-20-38			15.0-15.3 White compact limey silf. 15.3-16.5 Very fine tan sand, dry-compact.	SVA -O
	20.0 <u>-</u> 20.0 <u>-</u> - -	9035	12-45-40(2")				not drill been 21 feet, Too
4	-	į					hard.

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# DRILLING AND SAMPLING LOG

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Project Name and Number: Reese AFB-IRP (DF-2000) Well	Casing Size and Type: NA
Site Location: Site 001 Industrial Lake Scree	n Size and Type:
Boring/Well No.: 00/-133 Scree	ned Interval: NA
Orilling Contractor: Environmental Drilling Co. Borin	
Drilling Equipment: Mobile B-53 - Hollow stem auger Date:	7/29/86 Start Time: 12:44
Driller: Bobby Knopf Geologist: Mike Benner	Completion Time: /4:24
Driller's Helper: Eddie Chandler	
Total Depth of Hole: Z	3.5. Groundwater Depth: NA
Completion Depth:	A Surface Elevation:329938

		!	Graphic	Completion		
Depth	Sample	N-blows/6"	Log	Data	Description	Remarks
1.0 -2.5		/-/-2		NA	1.0-1.3 Brown gray self with sandy clay 1.3-1.4 Fine black brown sand	04.0' Augered
- 506-5 -	9018	1-3-4			1.4-2.5 Brown tight clay With sandy sift. 5.0-5.6 Gray-brown clay to sift	OVA - 0
- /0·0/l·5 -		2-15-60			5.6-5.8 Fine brown sand 5.8-5.9 Gray-brown clay to silt 5.9-6.5 Light gray dry silt to clay.	OVA - 30 ppm
15.0 - 76.5 -	90/9	5-30-35			10.0-10.7 Black maist clay trace silt. 10.7-11.5 White weathered caliche 15.0-16.5 White dry caliche	ora - 0
- 20.021.5 - 22.0 -23.5		5-14- 22 19-28-32			The gray diry canon &	Augers would not drill be on
		71 20			22.0-23.5 Red-gray dry caliche	22 feet . Too hard

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# DRILLING AND SAMPLING LOG

A	#=
Project Name and Number: Rccse AFB - IRP(DF-2000)	
Site Location: 5: FE 001 INCUSTRALLAKE	Screen Size and Type: NA
Boring/Well No.: 00/-132	Screened Interval: NA
Drilling Contractor: Environmental Drilling Co.	Boring Diameter: 6" Well Diameter: NA
Drilling Equipment: Mobile B-53 - Hollow stem auger	- Date: 7/29/86 Start Time: 08:48
Driller: Bobby Knopf Geologist: Mike Be	nner Completion Time: 10:20
Driller's Helper: Eddie Chandler	

Total Depth of Hole: 23.0 Groundwater Depth: NA Completion Depth: NA Surface Elevation: 3300.39

Depth	Sample	N-blows/6"	Graphic Log	Completion Data	Description	Remarks
- 1.0 -2.5 -	9015	3-2-5		NA	0-1.0 1.0-1.5 Top soil	0-10' Augered  0VA - 0
- 50-65 -		2-4-6			1.5-2.5 Tight groy dry clay  5.0-5.9 Brown loose top soil  5.9-6.5 Tight gray dry clay	Į.
- - 10.011.65 - - -		2-4-5			10.0 - 10.2 Groy cloy, trace sond. 10.2 - 10.9 Dry silt brown top sail. 10.9 - 11.0 Tight gray dry cloy.	
- 15:0 17:5 - - -	9016	4-22-23			15.0-15.4 Gray brown dry  Clay  15.4-17.5 White stained fine  1000e silt (caliche)	OVA - 0
20.0 215 21.5 - 23.0 - - - - -		5- 8-16 6-38-50				OVA - O Augers would not drill bean 21.5 feet. Too hand
- 						



# DEPARTMENT OF THE AIR FORCE HEADQUARTERS 64TH AIR BASE GROUP (ATC) REESE AIR FORCE BASE TX 79489-5000

23 Oct 86

Ecology and Environment, Inc. 1509 Main St. Suite 814 Dallas, Tx 75201

Dear Mr Benner

The information you requested during your last visit is attached. The well data is based on our real property records and the individual well data sheets on our active wells. When the base reopened in 1956 the existing wells were recorded on the real property records as a single entry. The individual data sheets for our active wells (wells 1, 5, & 8) give the year of completion; the completion years for wells 2,3,4,6 and 7 are estimated based on the completion dates of wells 1,5 and 8. The closure dates are not recorded on the real property records and are not available on any other document. We have a water analysis report dated 1976 for all active wells at that time and have identified closure as before or after that year.

The documentation on the paint trench includes analysis before excavation and analysis during excavation.

If there are any questions regarding this information please call me at 885-3150.

Sincerely

MICHAEL M. KELLER, Capt, USAF

Base Environmental Coordinator

5 Atch

- 1. Well Data Summary
- 2. Real Property Records
- 3. Well Data Sheets
- 4. Paint Shop Trench Analysis
- 5. Base Layout Plan

WELLS
AF
REESE

PREPARED: 20 OC

~!	WHEN PRILLED	ACTIVE/INACTIVE/CLOSED	REMARKS.
REESE AFB	1461	ACTIVE	LAST WATER TEST 1984
8	1461	CLOSED	PATE CLOSED UNKNOWN BEFORE 1976
3	1941	CLOSEP	DATE CLUSED UNKNOWN BEFORE 1976
4	2461	CLOSED	TATE CLOSED UNKNOWN BEFORE 1776
5	1943	ACTIVE	LAST WATER TEST 1984
9	1944	CLOSED	DATE CLOSED UNKNOWN AFTER 1976
2	4481	CLOSED	DATE CLOSED UNKNOWN BEFORE 1996
8	1945	ACTIVE	LAST WATER TEST 1984
-37	1961	ACTIVE	LAST WATER TEST 1984 USED FOR IRRIGATION OF AUTHLETIC FIELDS
10	1965	CLOSED	DATE CLOSED UNKNOWN BEFORE 1872
//	1961	CLOSED	DATE CLOSED UNKNOWN SERVENRE
12 TEPRU 42	1368	INACTIVE	NON-POTABLE WATER IN 1985
13	1973	ACTIVE	FIRE FIGHTING WATER
AKX 14 FIELD	1982	ACTIVE	POTABLE WATER FOR FIRE DEPT TRAILER TREATED BY HYPOCHLORINATOR
H	NOTE: CLOSED	WELLS HAVE BEEN CAR	HAVE BEEN CAPPED UNDERGROUND WERE NOT RECORDS.

Atch 1

			1.0		· \				9							87	36	16	17	35	35		17	]
T. 63	CODE	75.74	<b>19</b>	1	-	<b>1</b>	TD	750	841-166		म प्रमाण 10				TOTAL	3,912	33,174	53,310 91	55,527	55.579	56,189	60,402	60,746	
WYZ WELL	POMENCE ATURE										12) one # 1 am [=			1500	AMOUNT	3,912 87	29,261 49	20,136 55	2,216 50	51 94	610 00			
	CONTROL NO.	Texis	ATC	Usable	AR	Owned	anne.			ry Card	Tie (producing) wills	_		MEASURE TD		1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	OI ANTE
_	NF ACCOUNT NO.	STATE	ASSI GWENT	CONDITION	OCCUP ANCY	AIR FORCE INTEREST	UNIT OF AREA MEASURE	OUANTITY	CATEGONY	See Inventory	30 Jumble actuir	Construction		UNIT OF		1,750	0	. 0	0	0	00	00	0	20000
040010	I MCILITY NO.	day												DATE	COMPLETED	17/61	August 1956			/	i			T TO THE PARTY OF
RA 806	DRAWING NO.	000 gallons/day					SURE									thu 8)	through	y	Code 06103	#7	ell#5 to #4 of to water	irger unit		
18 Sep 56	CAP ACT TY	1,750,	POWER SOURCE	NO. OF PUMPS		REFRIGERANT	OF ERATING PRES		PRIME MOVER		AND ERE	*	CYCLE		DESCRIPTION	Wells (/	Subsequent improvements	of P Property	(08202) 06103 to	3	ec fr/w #8 fr/	1 # 1 tor v/12	BALANCES FORVARDED	
, Texas									~	TABOOIL					] <b>•</b>	Original	Subsequent	Transfer	Trans Code		Remove Mtr elec fr,   Conv Wtr Well #8 f)	Elect Repl	BALANCE	
	IAME AND NO.	Water Pumping Plant		Gas - Electricity											DATE	18 Sep 56		18 Sep 56	8 Mar 57	24 Apr 57	19 Sep 57 20 Sep 57	3 Dec 57		1433
Pesse Air	INSTALLATION NAME	Water Pu	FUEL USED	SUPPLY SOURCE	Wells	LIFT (Feet)	NO. OF BOILERS	,	NO. OF RETORIS		VOLTS		PHASE		VOUCHER NO.	25-57		26-57	190-57	252-57	123-58	193 <b>–</b> 58 97–59		AF FORM

Atch 2.

				- 1				ſ
VOUCK NO.	DATE	DESCRIPTION	DATE	UNIT OF	MEASURE	COST	28	7
			COMPLETED	AMOUNT	TOTAL	AMOUNT	TOTAL	
		BALANCES FORWARDED			1,750		60.746	17
136-59	16 Oct 58	Addition to Voucher 97-59 Trans Chlorinator to treatmt card		00	1:758	350 00	\$1,255 Hz	~
132-60		Well #3	4 Nov 59 23 Feb 60	00	1,750	G 80	60,402 17	~-9
151-62	No	nclatu 3009		0 880	1,750			90
306-62	Mar	mps on Wells	22 Jan	0	2002		<del></del>	2 6
236-63	24 May 63	Wells	Anr	288	1 750	2 139 19		
216-64	21 Sep 64	Trans pump and motor from 3008 Change in capacity of Water Wells	Jun	1,000	9 ~	l	255	122
87-65	2 Nov 64		13	108	679	3.500.00	126	2
139-65	17 Mar 65	Alteration&Activation of Well Replaced EMEXX how agan chan	3 Feb	177	786		1	31
		Capacity of wells #4 , Installe Submersible numbing unit at well	7		-			<del>.</del>
		100	•	0	982	7, 105 76	81 710 5	2
99-05	15 Sep 65	Instl time met	9 Apr 65	0	786	23		53
95-66	19 Oct 65	Instl 200Amp 440 V panel				1	1 .	1
		Klec &	24 Mar 65	0	786	256 79	82.217 24	T
89-67	16 Jan 67	Jo 1	16 Nov 66	161	617			J ~
163-68	19 Feb 68	Install battery tri on Wells #1, 4, and	29 Jan 68	0	116	-		8
228-68	20 May 68	. Well # 12.	20 May 68	160	1,137	1,980 32	88,921 28	
229-68	6 June 68	Adj voucher to 228-68 to capibalizadditional cost	a 20 May 68	0	751.1	195 37	89 116 68	, v
55-70	2 Oct 69	Remove engine from well #4 and turn into salvage	Jul	0	1,137		1-0	65
81-70	69 ¥on 7	Full pumps from wells #4,8,and 10	18 Jun 69	164	973	6,165 73	<del></del>	-
		osting to AF	1430 Cards di	scontinued a	8 of 1974, \$73	Q	\$ 01768	\ \{\sigma}
080 000 040		, ,			Þ	S. GOVERNMENT PRINTING OFFICE: 1957 G -43531	FFICE: 1937 O -438318	ı

400H/0		CAPACITY					4,422,21	85.00ea	85.00ea										<b>₹</b> \$	444444
WATER WELL-40010	BUILDING NO.	OUANTI TY OF UNIT OF				1	4	٦	14		6PM						197.	•		
		UNIT OF		ric		<b>/</b> -	8	8	80		90 r		 	•	1-	<del> </del>				-
16 Jan 67   CLIO-10	DATE CONTROL NO.	NOMENCLATURE T	10 " Casing 199 Of Capacity Depth of well 165 ft.	Submargible pumping unit, 72 HP electrimotor, 3 phrss. 60 cycle, 240 volts.	4" Sparkling, 6 die	T T	o Bldg over-vell,	Trickle charger, input 1209 AC, out-	macksox + ol fabi	-	1 ea chemical feeder, Aqua Fure, mumbe	phase, 60 cy, 2200.	230V,		Chioritator & 27 gal solution container	Testing to AF 1430 Cara-	14" Hq USAF/PRERA Ltr 11		7: 	
IIX UBNY		CATEGORY	Blay soll					Well 1, X		Of A. A.	Well#12 at									_
	ID NO.	OCCUPANCY	16 Jan 1967		10-110-71			19 Feb 68			20 May 68									
REESE AFB, TEXAS	INSTALLATION NAME AND NO	ASS I GNMENT	89-67					163-68			228-68								3,75	-
									D-4	10					•					

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	سلد																												-
20016 46010	CAPACITY			2,100,00	00,09				2 500 00		3,047,00	1,27,1,00			1,950.00	250 00	A.30.00	75.00		1,273.68	534.90	60.00	39.28		6,469.30	42.0)	138.00		1957 Q-428672
WELL	UNIT OF			-1-	н,		+		-		+		1-1	-	٦.	-	4	r-4 r	-	4	-1 -	7	4	À	<u>'</u>	7	<b>b</b>	0	INTING OFFICE
MATER VELL	QUANTI TY																							١				nued as	\$ U. S. GOVERNMENT PRINTING OFFICE, 1957
	UNIT OF			8 8	8				8		80	8	98	68	8	80 8	3	8	8	93	8 8		8		8	-	8	onti	1
UBNY   14 Juns 1965   5416-10-10   UBNY   0.0172	NOMENCLATURE	12" Cacing 175 GH Capacity	Depth of Well 160'	Nump Turbine Famora 40HP Ser# 3113	Vator Lavel Testing Equip, Ashcroft	12" Steel Casing W/10' of 16" Casing	35EC EM	Depth of well 165'	W/40HP US Motors Elec Motor Ser#	Fump Booster GE 100 HP 2000 GFM		Nump Booster GE 40 HF 750 GFM   Ser # 5605193	American 2000 GFM #	keerican 750 GPM 🧸	Engine, Climax 100 HP #15833	Aducer Lin	Sultan Automatic Float Control Ser	8000	ng Pepth 160	oing unit 75 GR	Motor Electric, 19 Hr Fairbanks Morse Electric Starter G.E.	Water-Testing Equip, Ashcroft	Mater G.	12 3/4 Castry, Depth of well 1/0 Prep. 175 GPM Deming	Motor, 15 HP Franklin Ser # ST-9800	A .	WOITS TO THE OF	Posting to AF 1430 Cards disconti 1 March 74 IAW Hq USAF/PRERA I F.	
	CATEGORY	WW011 # 7	1 Bldg 3007	: •		T T T T T	P14g 3008	Zori &		Runp Sta	Bidg 3				engines from				Well # 9	B1dg 3009	1			W WELL IF THE	Biografia	MOTO L			
TEXAS	OCCUPANCY	•		10-110-71		7									services Converted	W/0 3250-4		•	168-62					110-11		\$0-66 MIK			*
Raese AFB, TEXAS															Contractual				1 Dec 61				- 1	CO IBJ /I		15 Sep 65	121		AF IS JUN SE 1438

						l															_
Uswis Locato	CAPACITY		2,100.00	92.12					2 100 00	720.00		340.00	8# \$		2,100,00				1,438.25		E:1957 O-428672
TIS	UNIT OF											1	·								ZINTING OFFIC
WATER WELL	QUANTI TY		-	-						-	-	/-	-4-4		-	<b>-</b> 4		-4	44		な U. S. GOVERNHENT PRINTING OFFICE: 1957
	UNIT OF		3	8	8				8	8	3	4 8	8		8	3	8	8	1	1	*
55   <u>CSOUO-10</u> -8410=10 contrac. 110.	2 AD A	8.	Pamora 350 GPM, 40 HP	or # 613020 Drive. Amerillo.	#11060 Grand		Costne 300 CEL Gerantty	Z 250 CSK Cepacity	Pamona, 250 GPH	ghouse, 40 HP	Pump Drive, Ameritica,	6 0yl Bur#61614 Stans	ng Equip I Asheroft	12 " Steel Casing, \$50 GPM Capacity Depth of well 159' 25 HP Elec Mtr	Rump, Turbine, Ramona Ser # 3114	1511 500 GFM Layne 50HP Ser#23537	Rump Drive, Amarillo, 17390	tors 20 HP	Rockford Ser # 184313 al Ser #10319 Stand by		- BUILDINGS
14 June 1965 UBNY   14 June 1965		Depth of well 1574	Rimb, Turbine, Bar Ser # 3115	Motor GE, 40 HP Ser # 6. Right Angle Puro Drive.	\$2 HP Ser # 870	12" Stoel Casing NW Capacity Not	Well Capped	12" Stool Casing, Dorth of Mall 141	1	14 TE	Ingle	ter.	Water-Lavel Testi	12 " Steel Casing Depth of well 159	Rump, Turbine, Bar 24 Casthe Cement	Pepth of Well 151		Motor Elec, US Motors Ser # 2110134	Roser dake off, Ro		INVENTORY DETAIL
XXXX	CATEGORY	(Well # 1)	Active			Well # 2		*****					Decrivate Action	Nell # 5 Bldg 99	111 N	CE14g 531	Ver.		ards disconting	TOT EPTHAM	
TEXAS	OCCUP ANCY				- 97			12-011-07											Royar dake off, Rocarina Howar dake off, Rocarina to AF 1430 Cards discontinue Brates to AF 1430 Cards discontinue and a specific statement of the statement of	1 March 74 IAW Hq USAF/FREERS LEE	82
REESE AFB, TEXAS	ASS I GNMENT																				AF 15 JUN Se 1438

	SCREENING PUMP INFO.	150' 677 6 150' 150' 150' 677 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	PLASTIC PUMP HAS A HAS A CASING BCIREENED CHLORINATOR  S.I. PREPERTED 3/4 H.P.  CASING SUB. PUMIP  E DICAVEL 50 CPM  PACKED USED PAILY
#	SCREEN	Pump 13 2 2 Cree 2 15 8 Penformio CASIVE 4 GLAVEL PECCEO	PUMP SCREENED CHLORING SCREENED SH HIP CASING CASIN
FLU.	CASING	5. 12 O. 12 O. 12 O. 12 O. 12 O. 12 O. 13 O. 13 O. 13 O. 13 O. 14 O. 14	CASING SCREENS ON PARTIES OF SCREENS OF SCRE
COUNTY WATERIAN	STATIC Water	U.K. = 13.5,73	12 C. C. C. C. C. C. C. C. C. C. C. C. C.
TERRY CO	DEPT	150	0 ki 15 S
,	DATE	# 13 1973 IZERT CA 1973 NEXT TO FIRE TRAINING BAILN	MR.Z Domestic Well
	LOCATION	本 13 120 120 120 120 120 120 120 120 120 120	14 14 NEXT TO TRAILOR 200.

5 February 1959 AFM 85-13 INSTALLATION REESE WELL DATA LOCATION DATE CONSTR ENDED LUB BOCK COUNTY DRILLED PUMPSETTING DEPTH

150 FT

RECOVERY TIME

SLECIFIC CAPACITY (Cal per ft) GPM = 250 DEPTH DIAMETER 157 FT. ORIG STATIC WATER LEVEL DRAWDO WN TEST DATA AIR LINES AND GACES Well capacity Pumping level No Length GPM DRAWDOW:1 Yes WELL PUMPING EQUIPMENT 250 TYPE AND MAKE POMONA TURBINE. SUCTION (Ft) SIZE AND LENGTH COLUMN 811 37cel NUMBER BOWLS HEAD SIZE AND TYPE NO. STAGES Above grnd B Below grnd 153 Total 8 Claseo 1760 40HVY 230/140 MIRED CONTINENTAL DESCRIPTION RPM 1750 LENGTH SETTING CASING AND WELL SCREFNING MATARIAL USED **EACH** DEPTH ISFT.

Figure 27. AF Form 996, Well Data (Front).

AF FORM 906, AUG 58

WELL DATA		REFSE	MAF	3 Tex.	WELL NO.	
ELEVATION (Ft) LOCATION	Bork Co			DATE, CO	NSTR ENDED	
W DRILLED					,	
E DEPTH 59'	DIAMETER	4 "	j	MISETTING D	EFTH	
L ORIG STATIC WATER LEVEL	20	3"	L_	COVERY TIME	,	
TEST DATA Well capacity Pumping leve	AIR LINES  Yes No	Length		GPM	(Gal per	4935
350-100 150	1 1 1 1 - 1 -	G EQUIPMENT	<u></u>	DRAWDOWN	20.3//	
TYPE VID WAKE	POMO	NA			LOO	
M 150 6	D LENGTH	COLUMN 8		2=7		
Above grnd Below grnd	Total	MBER BOWLS		C LOSED	NO. STACES	* 1
SERIAL NO. TYPE	MAKE HP	RPM FRA		SE CYCLES	VOLTAGE	
M 417603 KZKV-3 0 STAIDBY POWER	MIKE 23	1465		160	330-440 SIZE	
O INP RFM	DESCRIPTION		<u> </u>			
8			· · · · · ·	CENTELLY)	V 224 62 77 1	
CASING AND WELL S				SETTING . DEPTH	LENGTH FACIL	
STEEL -	same	aswel	141	<u> </u>	COFT	
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AF FORM 09G, AUG 58				I I I I I I I I I I I I I I I I I I I	1 of 2 linger	

Figure 27. AF Form 996, Well Date (Front).

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PFLL DATA		INSTALLAT	MFA	3 7 c x	WELL NO.
ELEVATION (Ft. LOCATION LUB	BOCK			DATE.	CONSTR ENDED
TYPE	BUCT	- Ountry	<del></del>		<del>' 7 /</del>
E DEPTH .	DIAMETE	R	1	PUMPSETTING	DEPTH
L ORIG STATIC WATER LEVE	L DRAWDOW	24 ·	<del> </del>	RECOVERY TI	V.E.
TEST DATA	ATR LIN	"JAFT ES AND GACES	1	, ,	TY (Gal per
Well capacity l'umping leve		No Length	11.1	DRAWDOWN	2017
		PING ZOUIPMEN	VT.	140,410,41	
P TYPE AND MAKE	TO TUR	BINE	SUBM	eRSIAB	CAPACITY
u SUCTION (Ft) SIZE A	ND LENGTH	COLUMN	Tee		
P HEAD Above grnd   Below grnd	Total	NUMBER BOWLS	SIZE	AND TYPE	NO. STACES
40 160	200	BP RPM I	TRAME   PI	AASE   CYCLE	S VOLTAGE
4 37 9700   SUB	FRANKLIN	5 1100	6	0 60	220-440
T NO	MAKE			·	SIZE
Q HP RFM	DESCRIPTION		:		
CASING AND WELL	CCDEENING MAT	SETAL HODD	<del></del>	SETTING	LENGTH
		rikial osed		DEPTH	FACH
Steel	He	Qlum	<u> </u>	<u> </u>	COFT
15 stell	Casing	1-501Y	leas		
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AF FORM 996, AUG 14		<del> </del>		Fa	e 1 of 2 Page:

Figure 27. AF Form 996, Wall Date (Front).

WELL DATA	INSTALLATION	MPB	7≤ X	WELL NO.
ELEVATION (Ft) LOCATION  3,338 L. Grach			DATE CO	VSTR ENDED
W TYPE ORILLED				
E DEPTH . DY AMETER	6 "	PUME	SETTING D	
L ORIG STATIC WATER LEVEL DRAWDOWN	3 ~ 7	PECO	VERY TIME	
TEST DATA AIR LINES	AND CACES		C CAPACITY	Gal per
30 144-77	Length 158	,	VMDOM.1 = -	23/7
P SUBMERSIBLE			4	CAPACITY
U   SUCTION (Ft)   SIZE AND LENGTH	COLUMN COLUMN		PORSE	100
		SIZE AND	TYPE	NO. STAGES
Above grnd Below grnd Total	6	4"	· /	6
M SERIAL NO. TYPE MAKE HP	RPM FRAME	PHASE	CYCLES	VOLTAGE 220-440
O STALIDBY POWER MAKE				SIZE
0 HP RFM DESCRIPTION				•
CACCAC AND HELL CONTINUO HARLET	AT LICED		SETTING	LENGTH
CASING AND WELL SCREENING MATERIA			DEPTH	EACH
Steel 4"	<del>/r</del>			10/1.
16" Steel Casing				
0//	3 "74	700		
screen - 8 long	76 m	el -		
cut slots	·	:	<del> </del>	
A Thirty Committee of the Committee of t		<u> </u>		**
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AF FORM 996, AUG 18			Page	Lof 2 Pages

Figure 27. AF Form 996, Well Date (Front).

		WELL DATA		IIISTALLATI Recse	ON	Tev	WELL NO.
	ATION (Ft	LOCATION	200 1	COUNT		DATE CO	ISTR EIDED
1	(PE O o	1/-D	700	<u> </u>	<b>y</b>		
	EPTH /	IFT	DIAMET	EB IN	PU	PSETTING D	EPT!
OI	RIC STATIC	WATER LEVEL		WN	FE	CVERY TIKE	
	TEGT		AIR LI	NES AND GAGES	n ken	IH C	(Gal per
Well	caracity	Pumping level	Yes	No Longth	[ [반] (	DIKAWDOW")	20
			WELL PU	MEING EQUIPMENT			CAPACITY
۱	DE VAD IV	R S L B A	10 1	FAIR BANK	r. & Mc	N.C.C.	CAPACITY
ا ا	TION (Ft		ND LENGTH E (N	COLUMN	teal	<u></u>	
AI	bove grnd	HEAD Below grnd	Total	NUMBER BOWLS	SIZE A	VD TYPE	NO. STAGE
	FRIAL NO.	TYPE	(50	HP RPM FI	RAME   PHAS	SE CYCLES	VOLTAGE
M 40	TAMBY POW	FM HO	MIKE.	1 1100	Sim	10 60	220
Ţ	<u> </u>		DESCRIPTIO	NAT		<u> </u>	1
O   HI R		RPM	Drackittic	-			
<del></del>	CASIN	IC AND WIFTE !	SCREENING MA	TERIAL USED		SETTING	LENGTH
	C P					DEPTH	EACH
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Figure 27. AF Form 996, Well Data (Front).
D-48

WELL DATA	HISTALLATIO	AFB	7cx	WELL NO.	
FLEVATION (Ft) LOCATION	COBATY			STR ENDED	
TYPE ORILLED		· · · · · · · · ·			
E DEPTH / C	DIAMETER	PUMPS	SETTING DI		
ORIG STATIC WATER LEVEL	DRAWDO WY	7F :01	TERY TIME		
TEST DATA	AIR LINES AND GACES		CAPACITY	(Cal per	> M
Well capacity Pumping level	Yes No Length	(tt) GPA		75	3.7
TYPE AND MAKE	VELL PUMPING EQUIPMENT			CAPACITY	
TYPE AND MAKE  OUT SUCTION (Ft) SIZE AND LEN	CER L-SS			75	
1.150 HEAD	NUMBER BOWLS	SIZE AND	TVDW	NO. STAGES	
Above grnd   Below grnd   Tota			/ <i>N</i>		
SERIAL NO. TYPE MAKE	E HP RPM FRA	ME PHASE	CYCLIS	VOLTAGE	
P   STADDBY POWER   MAKI	16 300 21	51L	160	115/230 312h	\ \.
DESCRIPTION DESCRIPTION	CRIPTION				
	•				
CASING AND WELL SCREEN	NING MATERIAL USED		DEPTH	LENGTH EACH	
S?eeL			V <sub>2</sub>	(OF)	
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Figure 27. AF Form 996, Well Data (Front).

AF FORM 996, AUG 58

# APPENDIX E LOCATION AND ELEVATION SURVEY F LOCATION AND ELEVATION SURVEY FIELD DATA

LEG FROM	ANGLE	S.DIST	7CMTTU	u 1 4 T				+ <del> </del>
LES PRUS	BEARING	H. DIST	V. DIST	H.I. H.T.	רַ מַּיִּ	NORTHING	EFSTINE	ELEVATION
	NN 2 23 30,00 (	REF BRB						
					11	732,590.6100	620,284.0800	
1 11	AR 184 30 00.00 SW 2 06 30.00	2702.6000			1	729,889.8395	170 101 1570	
2 1	AR 135 04 06.00	2/02.8000	<del></del>			727,007.0373	620,184.6539	
	SE 42 49 24.00	1324.8700			2	728,918.1095	621,085.2211	
3 2	AR 177 41 02.00					700 141 1071		
4 3	SE 45 08 22.00 AR 274 15 39.00	725.0300			3	728,406.6851	621,599.1409	
, ,	SW 49 07 17.00	1156.2500			4	727,649.9674	620,724.9028	
5 4	AR 174 24 01.00							<del></del>
	5W 43 31 18.00	1660.7800			5	726,445.7125	619,581.2418	
6 5	AR 148 18 09.00 SW 11 49 27.00	2134.9200	-		6	724,356.0933	619,143.7777	
7 6	AR 278 26 25.00	213417200			Ū	724,000.0700	01/11/01///	
	NW 69 44 0B.00	2350.9600			7	725,170.3566	616,938.3326	
8 7	AR 191 08 08.00 NW 58 36 00.00	4044 7400			8	777 605 7560	112 ON 7102	
9 8	AR 250 06 00.00	4846.3600			0	727,695.3569	612,801.7182	
	ME 11 30 00.00	8255.6300			9	735,785.2527	614,447.6261	
10 9	AR 285 09 30.00							
11 10	SE 43 20 30.00 AR 240 57 06.00	6517.3800		<del></del>	10	732,861.1050	620,272.1949	
11 10	SE 2 23 24.00	269.8200			12	732,591.5197	620,283.4468	
12 12	AR 184 30 00.00	22//22//				,	,	
	94 2 06 30.00 0 00 06.00 0 00 00.00					S. S. S. S. S. S. S. S. S. S. S. S. S. S	<u> </u>	
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SE 34 5 31,9 28,8 COMPASS AD LEG FROM	0 28.16 1.1084 CLOSING LIN 44.6000 DIST TRAV 20.5308 PRECISION  JUSTMENT  ANGLE BEARING	S.DIST H.DIST		H.I. H.T.	TO 11	NORTHING 732,590.6100	EASTING 620,284.0800	ELEVATION
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SE 34 5 31,9 28,8 COMPASS AD LEG FROM	0 28.16 1.1084 CLOSING LIN 44.6000 DIST TRAV 20.5308 PRECISION JUSTMENT  ANGLE  BEARING  SN 2 06 25.70 SE 42 49 23.01	S.DIST H.DIST 2702.6749 1324.9155		H.I. H.T.		NORTHING  732,590.6100  729,889.7626  - 728,917,9948	EASTING  620,284.0800 620,184.7075 621,085.3009	ELEVATION
SE 34 5 31,9 28,9 COMPASS AD LEG FROM	0 28.16 1.1084 CLOSING LIN 44.6000 DIST TRAV 20.5308 PRECISION JUSTMENT  ANGLE BEARING  SW 2 06 25.70 SE 42 49 23.01 SE 45 08 20.72 SW 49 07 09.88	S.DIST H.DIST 2702.6749 1324.9155 725.0548 1156.2542		H.I. H.T.	11 1 2	NORTHING  732,590.6100  729,889.7626  728,917,9948  728,406.5498  727,649.7991	EASTING  620,284.0800 620,184.7075 621,085.3009 621,599.2352 620,725.0200	ELEVATION
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SE 34 5 31.9 28.9 COMPASS AB LEG FROM  1 11 2 1 3 2 4 3 5 4 6 5 7 6 8 7 9 18	0 28.16 1.1084 CLOSING LIN 44.5000 DIST TRAV 20.5308 PRECISION JUSTMENT  ANGLE BEARING  SN 2 06 25.70 SE 42 49 23.01 SE 45 08 20.72 SN 49 07 09.88 SN 43 31 10.99 SN 11 49 21.79 NN 59 44 12.09 NN 58 36 02.88 NE 11 30 05.18	S.DIST H.DIST 2702.6749 1324.9155 725.0548 1156.2542 1660.7916 2134.9708 2350.8931 4846.2061 8255.4322			11 1 2 3 4 5 6 7 8	NORTHING  732,590.6100 729,889.7626 728,917,9948 728,406.5498 727,649.7991 726,445.4969 724,355.8169 725,170.0133 727,694.8756 735,784.5363	EASTING  620,284.0800 620,184.7075 621,085.3009 621,599.2352 620,725.0200 -619,581.3919 619,143.9701 616,938.5716 612,802.0532 614,448.1248	ELEVATION



# WILSON SURVEYING CO., INC

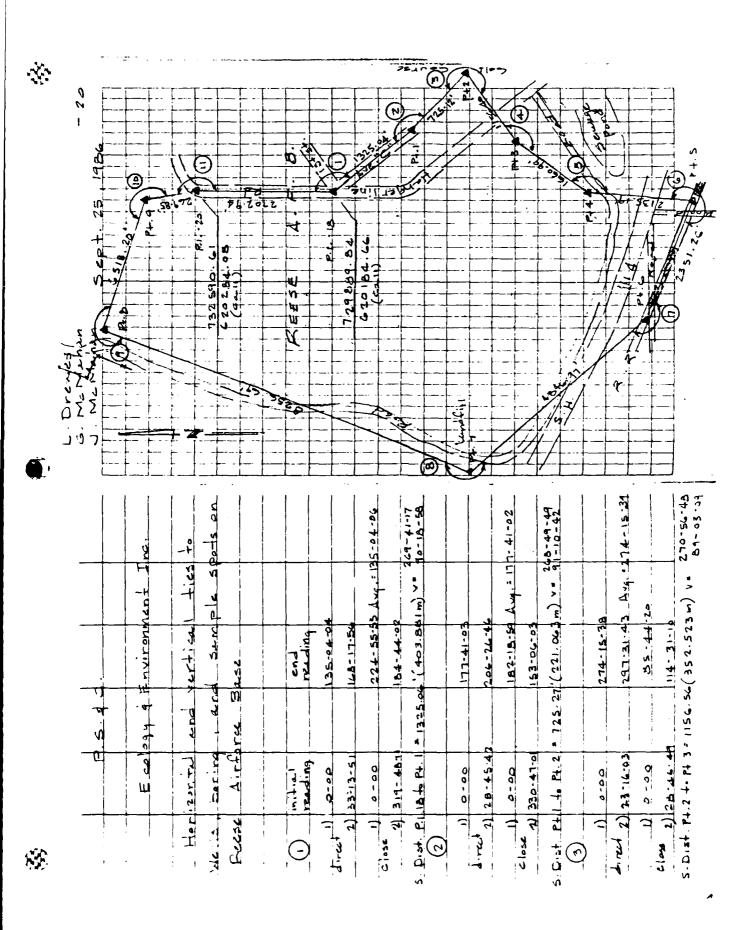
REGISTERED LAND SURVEYORS
TEXAS • NEW MEXICO • ARIZONA

# REESE AIR FORCE BASE WATER WELLS, BORINGS AND WATER SAMPLE POINTS

DESCRIPTION	LATITUDE	LONGITUDE
B1 B2	33°35'31.588" 33°35'30.572"	102°01'51.068" 102°01'53.092"
В3	33°35'29.412"	102°01'54.731"
B4	33°35'28.257"	102°01'56.143"
B5	33°35'26.964"	102°01'53.945"
В6	33°35'27.886"	102°01'54.176"
В7	33°35'27.900"	102°01'53.178"
B8	33°35'28.605"	102°01'53.238"
В9	33°35'28.425"	102°01'52.305"
B10	33°35'30.544"	102°01'51.015"
005-W1 TOP PVC PIPE		102°01'48.321"
001-9003	33°35'15.435"	102°01'34.494"
001-B1	33°35'15.599"	102°01'38.583"
001-B2	33°35'14.513"	102°01'38.555"
001-9001	33°35'13.861"	102°01'38.918"
INLET DELTA	33°35'12.557"	102°01'39.156"
001-B3	33°35'11.346"	102°01'38.700"
001-9005	33°35'10.682"	102°01'36.897"
001-9007	33°35'10.990"	102°01'35.248"
001-W1 TOP PVC PIPE		102°01'35.024"
003-B1	33°35'10.664"	102°01'59.968"
003-B2	33°35'11.575"	102°02'00.304"
003-B3	33°35'11.030"	102°01'58.266"
003-B4	33°35'10.164"	102°01'58.203"
001-9004	33°35'02.882"	102°01'43.778"
002-W1 TOP PVC PIPE		102°01'45.935"
002-9027	33°34'49.751"	102°01'47.334"
002-9029	33°34'53.053"	102°01'47.130"
002-9025	33°34'54.569"	102°01'47.715"
002-9030	33°34'53.890"	102°01'53.910"
002-9026	33°34'53.166"	102°01'54.871"
002-B1	33°34'53.167"	102°01'56.106"
002-B2	33°34'49.214"	102°01'59.732"
002-B3	33°34'46.524"	102°01'59.419"
008-W1 TOP CONC BAS		102°02'17.665"
008-W2 TOP WELL SLA	.B33°34'31.280"	102°02'13.858"

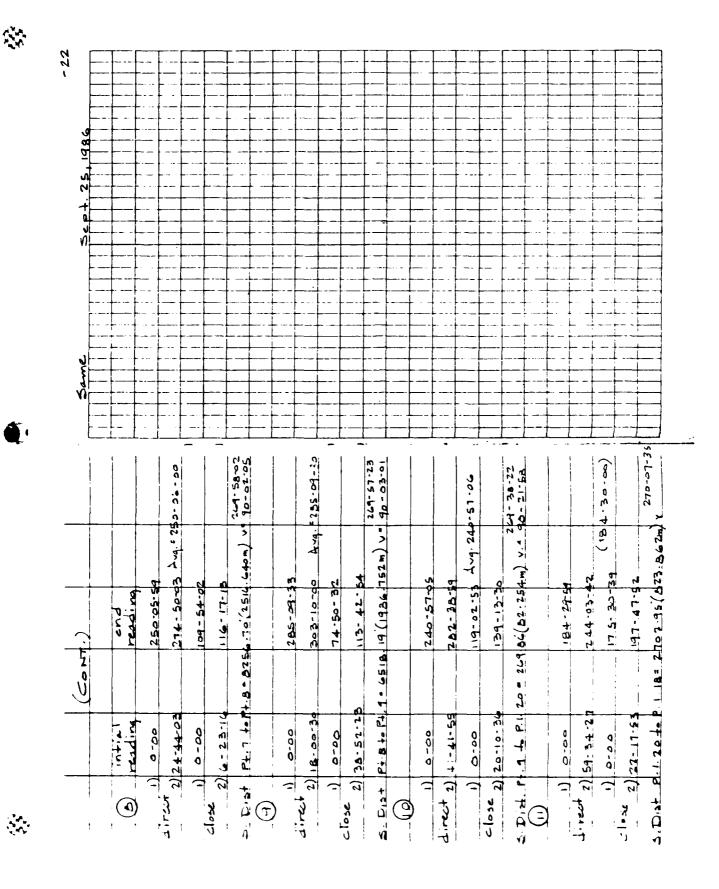
(806) 763-3388 • 1718 AVENUE N • LUBBOCK, TEXAS 79401

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008-W3 TOP CONC BASE 33°34'36.750"
                                              102°02'06.448"
008-W4 TOP WELL SLAB 33°34'35.317"
                                              102°02'34.829"
008-W5 TOP WELL SLAB 33°34'38.896"
                                              102°02'34.664"
008-B1
                     33°34'29.180"
                                              102°02'05.718"
008-B2
                     33°34'32.994"
                                              102°02'10.131"
004-W1 TOP PVC PIPE 33°34'59.419"
                                              102°03'21.862"
                     33°35'06.271"
004-B1
                                              102°03'23.718"
                     33°35'08.269"
                                              102°03'16.511"
004-B2
                     33°35'04.354"
004-B3
                                              102°03'11.945"
006-B1
                     33°35'11.453"
                                              102°02'59.344"
                                              102°03'03.634"
006-B2
                     33°35'13.755"
006-9047
                     33°35'14.253"
                                              102°02'58.119"
                     33°35'14.259"
                                              102°02'56.904"
006-9048
007-B1
                     33°36'59.423"
                                              102°03'06.279"
007-B2
                     33°36'59.464"
                                              102°03'07.848"
                     33°36'54.557"
007-B3
                                              102°03'06.139"
                     33°36'55.914"
007-B4
                                              102°03'07.942"
PT #1
                     33°35'18.721"
                                              102°01'45.671"
PT #2
                     33°35'13.885"
                                              102°01'39.341"
                     33°35'06.031"
                                              102°01'49.280"
PT #3
PT #4
                     33°34'53.639"
                                              102°02'02.172"
                     33°34'32.769"
                                              102°02'06.271"
PT #5
                     33°34'39.902"
                                              102°02'32.730"
PT #6
PT #7
                     33°35'03.088"
                                              102°03'22.871"
PT #8
                     33°36'23.758"
                                              102°03'07.574"
PT #9
                     33°35'57.343"
                                              102°01'57.277"
PT #10
                     33°35'06.192"
                                              102°03'12.771"
PT #11
                     33°36'49.110"
                                              102°03'06.501"
                     33°36'19.435"
PT #12
                                              102°02'56.066"
                     33°35'27.943"
PI #18 MONUMENT
                                              102°01'56.803"
PI #20 MONUMENT
                     33°35'54.683"
                                              102°01°57.006"
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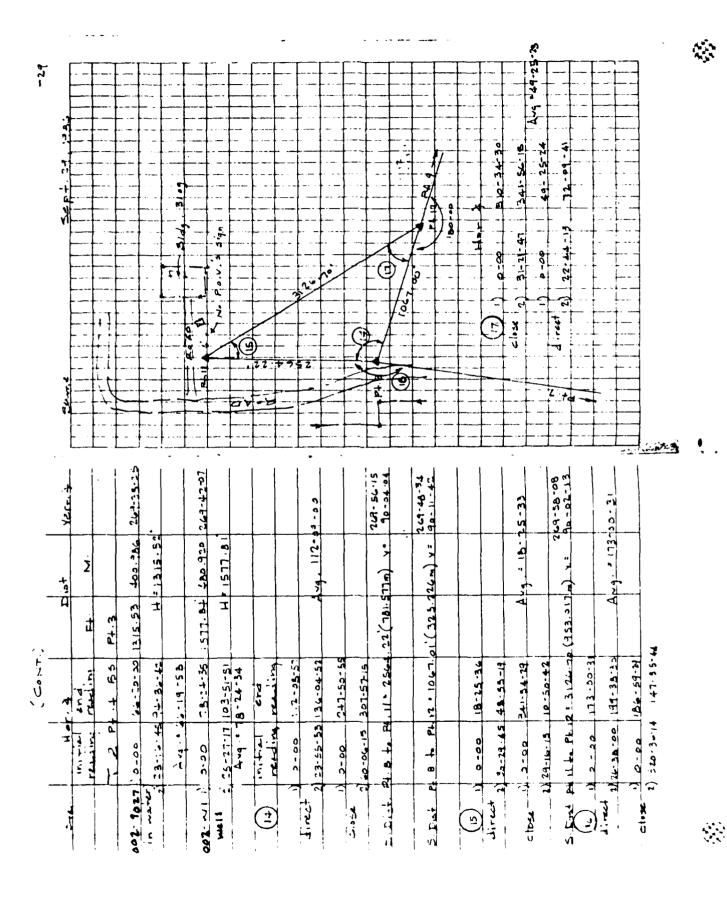
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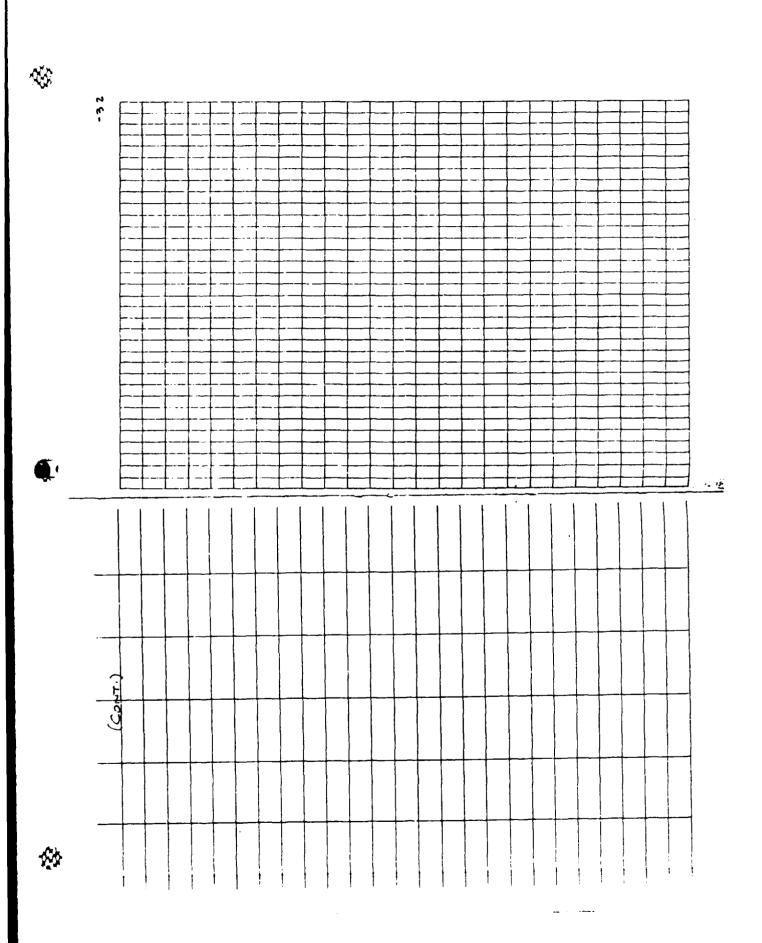
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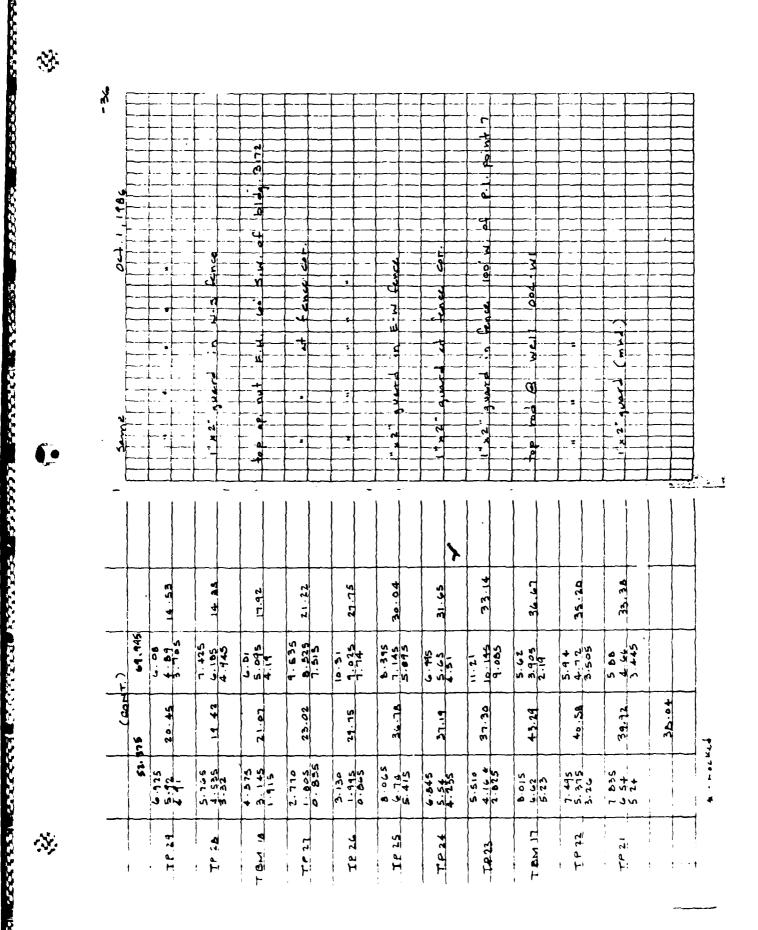
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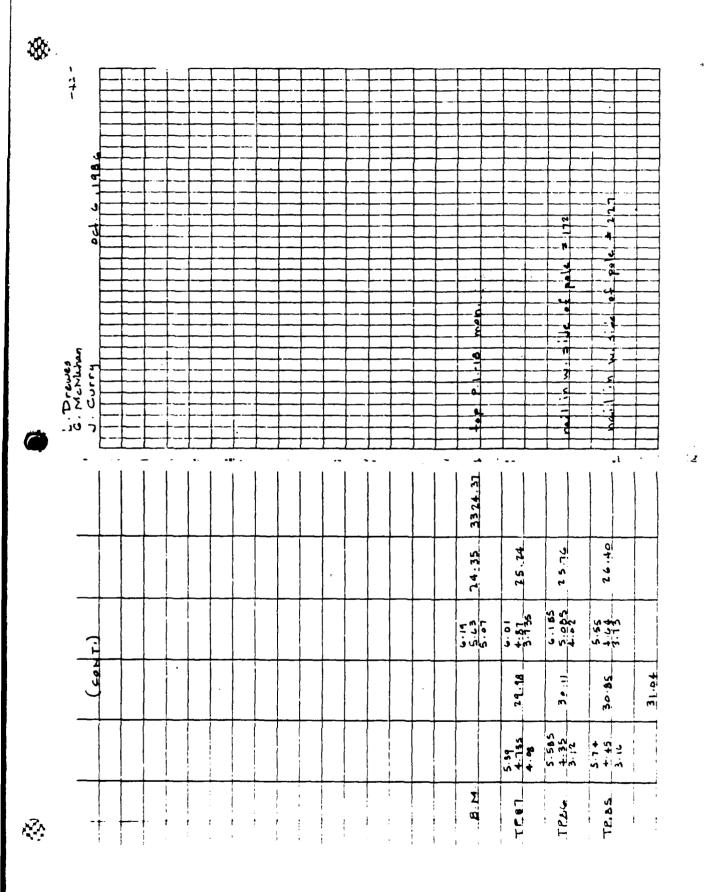
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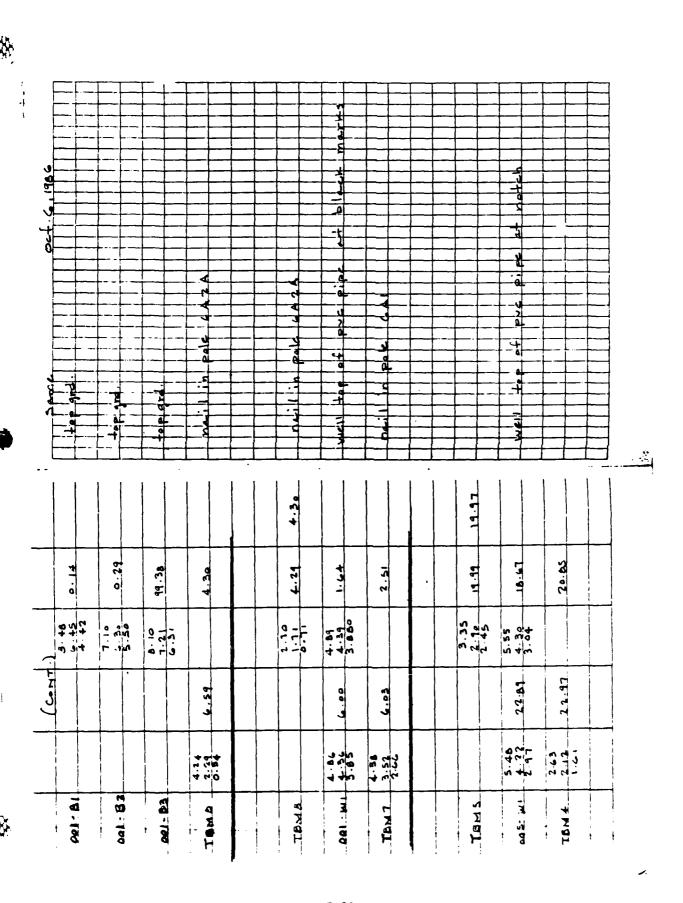


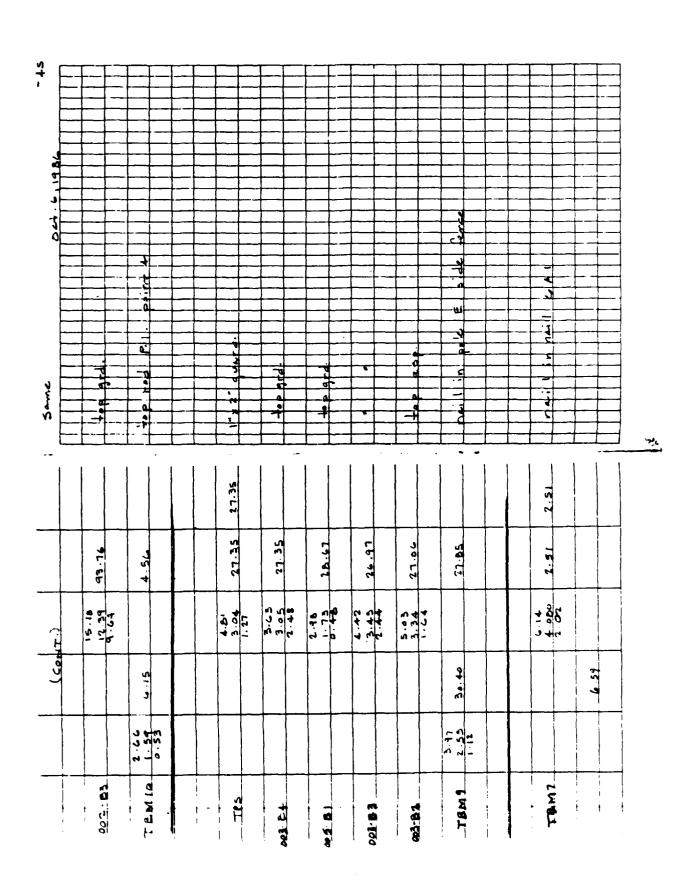
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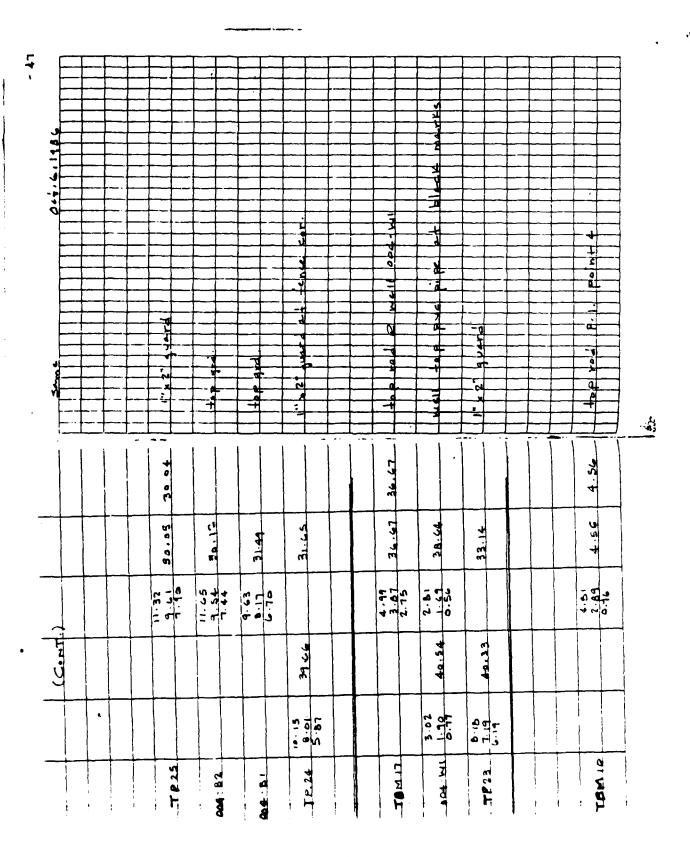


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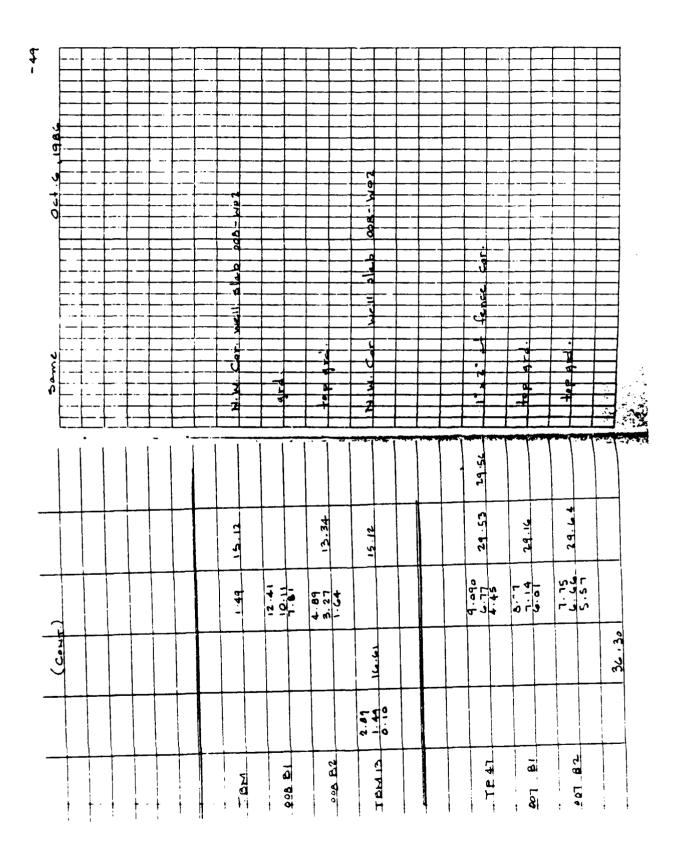


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## APPENDIX F RECONDITIONED DRUM DOCUMENTATION

CONTRACTOR DESCRIPTION AND INCOME.



## SCRUB-A-DUBB BARRELL CO.

810 N. Ash St. Lubbock, Texas 79417 P.O. Box 5034 RECONDITIONED DRUMS B. C. (Bill) Phillips 806/763-7209

August 1, 1986

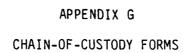
Subject: SOIL SAMPLE STORAGE DRUMS - 55 Gal. Open Top

DCT 17-H DRUMS

To: Whom it may concern

The 55 Gal. Open Top DOT 17-H Drums used for soil sample and storage which are currently being delivered to Reese Air Force Base Installation have been triple rinsed with hot water. These drums have never contained a chemical which come in contact with the steel surface inside. We removed a plastice liner which left the drum free of any chemical. These drums may contain a small of rust due to temperature inversions and condensation.

Sincerely, Billy C. Phillips Manager - Cwner





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\*See CONCENTRATION RANGE on back of form.

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ecology and environment, inc. 188 SUGG ROAD, PO 80X 0, SUFFACO, N.Y. 14225, TEL. 715, 532, 4451 International Societies in the Environment

CHAIN-OF-CUSTODY RECORD

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ecology and environment, inc.
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Distribution: Original Accompanies Shipment; Copy to Coordinator \*See CONCENTRATION RANGE on back of form.



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CHAIN-OF-CUSTODY RECORD

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ecology and environment, inc.
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CHAIN-OF-CUSTODY RECORD

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CHAIN-OF-CUSTODY RECORD

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CHAIN-OF-CUSTODY RECORD

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ecology and environment, inc.
198 suga no.a.p. 10. Box D. Buffalo, N.Y., 14228, TEL. 716. 632-4491

## CHAIN-OF-CUSTODY RECORD

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198 SUGG ROAD, P.O. SOX D. SUFFALO, N.Y., 14226, TEL. 716-632-4491 International Specialists in the Environment ecology and environment, inc.

CHAIN-OF-CUSTODY RECORD

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\*See CONCENTRATION RANGE on back of form.

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188 suga Road, F.O. B. S. FALO, N.Y., 14225, TEL. 716 432-4491

CHAIN-OF-CUSTODY RECORD

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CHAIN-OF-CUSTODY RECORD

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CHAIN-OF-CUSTODY RECORD

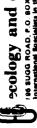
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Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files \*See CONCENTRATION RANGE on back of form.



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196 SUGG ROAD, P.O. BOX D. BUFFALO, N.Y., 14226, TEL. 716-632-4491 International Specialists in the Environment ecology and environment, inc.

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CHAIN-OF-CUSTODY RECORD

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8 REMARKS BL/Airbill Number Received For Laboratory By: (Signature) leceived By: (Signature) NUMBER OF CON-TAINERS 0165-PG-001-6P-86-90A 1165-16-05-66-16-16 0165-16-001-61-96-5010 7165-16-002-61-8031 015- R-02-61-86-5031 165. 16-02-61-16-50) 3165-16-001-61-86-5010 1805-11-19-205-11-2031 5/65-16-00-1-61-16-5073 0165-16-001-6P-16-9010 145-96-062-61-16-5631 165-18-16-002-61-86-5031 SAMALE ALMERAL Date/Time Sausa Relinquished By: (Signature) Sng 00 1 Nell - T 19 Cand 1300 pll 7 Six oct 40/1 T-20° can 100 PH 7 Site collect 1.18° cond 1200 pHT : : : = • EXPECTED COMPOUNDS (Concentration)\* SAMPLE INFORMATION Received For Laboratory By: (Signature) : . = AIA Relinquished By: (Signature) TIME STATION DATE 100 800 200 100 90 8

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196 SUGG ROAD, P.O. BOX D. BUFFALO, N.Y., 14226, TEL. 716-632-4491 International Specialists in the Environment ecology and environment, inc.

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CHAIN-OF-CUSTODY RECORD

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Pag 2 of 7

CHAIN-OF-CUSTODY RECORD

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\*See CONCENTRATION RANGE on back of form.

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CHAIN-OF-CUSTODY RECORD

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CHAIN-OF-CUSTODY RECORD

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CHAIN-OF-CUSTODY RECORD

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CHAIN-OF-CUSTODY RECORD

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ecology and environment, inc.
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CHAIN-OF-CUSTODY RECORD

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CHAIN-OF-CUSTODY RECORD

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CHAIN-OF-CUSTODY RECORD

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1G ROAD, P.O. BOX D, BUFFALO, N.Y., 14226, TEL. 716-632-4491 band Specialists in the Environment ecology and environment, inc.

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Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files \*See CONCENTRATION RANGE on back of form.

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### CHAIN OF CUSTODY RECORD

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<sup>\*</sup>See CONCENTRATION RANGE on back of form.



CHAIN-OF-CUSTODY RECORD

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### CHAIN-OF-CUSTODY RECORD

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#### ANALYTICAL DATA

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Table H-1
SAMPLE IDENTIFICATION CROSS REFERENCE

Lab Numbe <i>r</i>	Field Number	Description	Page
001-IND	USTRIAL WASTE LA	AKE	
4974A	GS-86-9001	Sediment, Lake Inlet Delta	H- 10
4975	GS-86-9002	Sediment, Lake Inlet Delta, Duplicate	H- 10
4976	GS-86-9003	Sediment, Spur 309 Drainage Ditch	H_ 10
1977	GS-86-9004	Sediment, Roadside Ditch	H-10
1982	GN-86-9005	Surface Water, Pump Inlet	H- 10
1983	GN-86-9006	Surface Water, Pump Inlet	H <b>-</b> 10
5911*	GN-86-9005	Surface Water South Pump Inlet	H <b>–</b> 11
940	GS-86-9012	Boring 001-B1, 5'-6.5'	H-56
5941	GS-86-9013	Boring 001-B1, 15'-16.5'	H-56
942	GS-86-9014	Boring 001-B1, 28.5'-30'	H-56
943	GS-86-9141	Boring 001-B1, 28.5'-30 Duplicate	H-56
5944	GS-86-9160	Drill Cuttings	H-56
945	GS-86-9161	Drill Cuttings	H-56
5946	GS-86-9162	Drill Cuttings	H-56
947	GS-96-9163	Drill Cuttings	H-56
901	GS-86-9015	Boring 001-82, 1'-2.5'	H-73
902	GS-86-9016	Boring 001-B2, 15'-16.5'	H-73
903	GS-86-9017	Boring 001-B2, 21.5'-23'	H-73
904	GS-86-9018	Boring 001-B3, 5'-6.5'	H-73
905	GN-86-9019	Boring 001-83, 15'-16.5'	H-73
906	GS-86-9020	Boring 001-B3, 22'-23.5'	H-73
5907	GS-86-9021	Well 001-W1, 0-3'	H-73
5908	GS-86-9022	Well 001-W1, 15'	H-73
5909	GS-86-9023	Well 001-W1, 30'	H-73
5910	GS-86-9024	Well 001-W1, 50'	H-73
5428	GP-86-9007	Sediment, South Lake Bottom	H-10
7348	GP-86-9010	Groundwater, Well 001-W1	H-39
3329	GP-86-9011	Groundwater, Well 001-W1	H-41
3364	GN-86-9008	Surface Water, South Pump Inlet	H-42
B365	GN-86-9009	Surface Water, South Pump Inlet Duplicate	H-42
002-SEW	AGE LAKE		
6004	GS-86-9033	Boring 002-B1, 5'-6.5'	H-11
6005	GS-86-9034	Boring 002-B1, 15'-16.5'	H <b>-</b> 11
6006	GS-86-9035	Boring 002-B1, 20'-21.0'	H <del>-</del> 11
6007	GS-86-9036	Boring 002-82, 1'-2.5'	H-11
8008	GS-86-9037	Boring 002-B2, 15'-16.5'	H <del>-</del> 11
6009	GS-86-9038	Boring 002-B2, 19'-20.5'	H <b>-</b> 11
6010	GS-86-9039	Boring 002-B3, 1'-2.5'	H_ 11
6011	GS-86-9040	Boring 002-B3, 15'-16.5'	H-11

<sup>\*</sup>Resample for phenois

Table H-1 (Cont.)

Lab Number	Field Number	Description	Page
002-SEWA	GE LAKE (Cont.)		
6012	GS-86-9164	Drill Cuttings	H-117
6013	GS-86-9165	Drill Cuttings	H-117
6014	GS-86-9166	Drill Cuttings	H-117
4978	GS-86-9025	Sediment, Sewage Plant Discharge	H-10
4979	GS-86-9026	Sediment, Low Flow Area	H-10
6426	GS-86-9029	Surface Water, Pump Inlet, N.E. Corner of Lake	H-134
6 427	GS-86-9030	Surface Water, Polishing Lake Discharge	H-134
6827	GS-86-9027	Sediment, Eastern Lake Bottom (0-1')	H-266
6828	GS-86-9028	Sediment, Eastern Lake Bottom (1'-2')	H-266
7022	GS-86-9042	Well 002-W2, 3'	H-153
7023	GS-86-9043	Well 002-W2, 15'	H-153
7024	GS-86-9183	Drill Cuttings	H-153
7349	GP 86-9031	Groundwater, Well 002-W1	H-392
3330	GP-86-9032	Groundwater, Well 002-W1	H-411
3366	GP-86-9044	Surface Water, Polishing Lake Discharge	H-428
367	GN-86-9045	Surface Water, N.E. Pump Inlet	H-428
003-POL	STORAGE AREA (AQ	UA SYSTEM) SPILL SITE	
6159	GS-86-9061	Boring 003-B2, 5'-6.5'	H <b>-</b> 167
6 160	GS-86-9062	Boring 003-B2, 10'-11.5'	H-167
6161	GS-86-9063	Boring 003-82, 15'-16.5'	H-167
6162	GS-86-9064	Boring 003-B2, 20'-21.5'	H-167
5163	GS-86-9065	Boring 003-B3, 5'-6.5'	H-167
5164	GS-86-9066	Boring 003-B3, 10'-11.5'	H-167
6165	GS-86-9067	Boring 003-B3, 15'-16.5'	H-167
6166	GS-86-9068	Boring 003-B3, 17.5'-19'	H-167
6167	GS-86-9069	Boring 003-B4, 5'-6.5'	H-167
6 168	GS-86-9070	Boring 003-84, 10'-11.5'	H-167
6169	GS-86-9071	Boring 003-B4, 15'-16.5'	H-167
6170	GS-86-9143	Boring 003-82, 27'-28.5'	H-168
6171	GS-86-9150	Boring 003-B2, 27'-28.5' Duplicate	H-168
6172	GS-86-9168	Drill Cuttings	H-168
6173	GS-96-9171	Drill Cuttings	H-168
6174	GS-86-9172	Drill Cuttings	H-168
6175	GS-86-9174	Drill Cuttings	H- 187
6227	GS-86-9057	Boring 003-81, 5'-6.5'	H-187
6228	GS-86-9058	Boring 003-B1, 10'-11.5'	H-187
6229	GS-86-9059	Boring 003-81, 15'-16.5'	H-187
6230	GS-86-9060	Boring 003-B1, 17'-19.5'	H- 187
6247	GS-86-9173	Drill Cuttings	H~188
004-SOUT	HWEST LANDFILL		
6043	GS-86-9075	Boring 004-B1, 1'-2.5'	H-225
6044	GS-86-9076	Boring 004-B1, 15'-16.5'	H-225
6045	GS-86-9077	Boring 004-B1, 30'-31.5'	H-225
6046	GS-86-9078	Boring 004-82, 5'-6.5'	H-225

Table H-1 (Cont.)

Lab Number	Field Number	Description	Page
004-S0UT	HWEST LANDFILL (	Cont.)	
6047	GS-86-9081	Boring 004-83, 5'-6.5'	H-22
6048	GS-86-9082	Boring 004-B3, 15'-16.5'	H-22
6049	GS-86-9083	Boring 004-B3, 30'-31.5'	H-22
6050	GS-86-9142	Boring 004-B3, 30.5'-31.5' Duplicate	H-22
6051	GS-86-9168	Drill Cuttings	H-22
6052	GS-86-9167	Drill Cuttings	H-22
6231	GS-86-9084	Well 004-W1, 3'	H-18
6232	GS-86-9085	Well 004-W1, 15'	H- 18
6233	GS-86-9086	Well 004-W1, 30'	H-18
6248	GS-86-9174	Drill Cuttings	H 18
6053	GS-86-9079	Boring 004-B2, 15'-16.5'	H-24
6054	GS-86-9080	Boring 004-B2, 19.5'-21'	H-24
6059	GS-86-9170	Drill Cuttings	H-24
7350	GS-86-9073	Groundwater, Well 004-W1	H- 39
8331	GS-86-9074	Groundwater, Well 004-W1	H-41
005 <b>-</b> CIV II	L ENGINEERING PA	INT SHOP TRENCH	
6055	GS-86-9090	Well 005-W1, 3'	H-24
6056	GS-86-9091	Well 005-W1, 15'	H-24
6057	GS-86-9092	Well 005-W1, 30'	H-24
6058	GS-86-9169	Drill Cuttings	H-24
7297	GN-86-9088	Groundwater, Well 005-W1	H <del>-</del> 30
72 <b>9</b> 8	GN-86-9089	Groundwater, Well 005-W1 Duplicate	H-30
7 325*	GN-86-9089	Groundwater, Well 005-W1	H-30
8 3 6 9	GN-86-9140	Groundwater, Well 005-W1	H-42
8385	GN-86-9140	Groundwater, Well 005-W1 Duplicate	H-42
006-ACTI	VE FIRE TRAINING	AREA	
4980	GS-86-9047	Sediment, 0-6" sump outlet	H-10
4981	GS-86-9048	Sediment, 0-6" natural depression	H-10
68 <b>29</b>	GS-86-9049	Boring 006-B1, 5'-6.5'	H-26
68 30	GS-86-9050	Boring 006-B1, 13'-16'	H-26
6831	GS-86-9051	Boring 006-B1, 20'-21.5'	H-26
6832	GS-86-9052	Boring 006-B1, 25'-26.5'	H-26
6833	GS-86-9053	Boring 006-B2, 5'-6.5'	H-26
68 34	GS-86-9054	Boring 006-B2, 15'-16.5'	H-26
6835	GS-86-9055	Boring 006-B2, 20'-21.5'	H-26
	GS-86-9144	Boring 006-81,13'-16' Duplicate	H-26
00.20			
68 <i>3</i> 6 6837	GS-86-9179	Drill Cuttings	H-26

<sup>\*</sup>Resample for phenols

Table H-1 (Cont.)

Lab Number	Field Number	Description	Page
007-NORT	HWEST LANDFILL/R	UBBLE AREA	
6234	GS-86-9093	Boring 007-B1, 5'-6.5'	H-18
6235	GS-86-9094	Boring 007-B1, 15'-16.5'	H-18
6236	GS-86-9095	Boring 007-B1, 17'-18.5'	H-18
6237	GS-86-9096	Boring 007-B2, 5'-6.5'	H-18
6238	GS-86-9097	Boring 007-B2, 15'-16.5'	H- 18
6239	GS-86-9098	Boring 007-B2, 30'-31.5'	H-18
6240	GS-86-9099	Boring 007-B3, 5'-6.5'	H-18
6241	GS-86-9100	Boring 007-83, 15'-16.5'	H-18
6242	GS-86-9101	Boring 007-B3, 30'-31.5'	H-18
6243	GS-86-9102	Boring 007-84, 5'-6.5'	H-18
6244	GS-86-9103	Boring 007-B4, 15'-16.5'	H-18
6245	GS-86-9104	Boring 007-84, 25'-28.5'	H-18
6246	GS-86-9138	Boring 007-84, 25'-28.5' Duplicate	H-18
6249	GS-86-9175	Drill Cuttings	H-18
6250	GS-86-9176	Drill Cuttings	H-18
6251	GS-86-9177	Drill Cuttings	H-18
6252	GS-86-9178	Drill Cuttings	H-18
6253	GS-86-9179	Drill Cuttings	H-18
6871 6872	GS-86-9105 GS-86-9106	Boring 008-B1, 1'-2.5' Boring 008-B1, 15'-16.5'	H-28 H-28
6872	GS-86-9106	Boring 008-B1, 15'-16.5'	H-28
6873	GS-86-9107	Boring 008-B1, 24'-25.5'	H-28
6874	GS-86-9108	Boring 008-82, 1'-2.5'	H-28
6875	GS-86-9109	Boring 008-82, 15'-16.5'	H-28
6876	GS-86-9110	Boring 008-82, 17'-18.5'	H-28
6877	GS-86-9139	Boring 008-B1, 1'-2.5' Duplicate	H-28
6878	GS-86-9181	Drill Cuttings	H-28
6879	GS-86-9182	Drill Cuttings	H-28
7294	GN-86-9111	Groundwater, Well 008-W1	H-30
7295	GN-86-9112	Groundwater, Well 008-W2	H-30
7296	GN-86-9113	Groundwater, Well 008-W3	H-30
7326	GP-86-9114	Groundwater, Well 008-W4	H-32
7327	GP-86-9115	Groundwater, Well 008-W5	H-32
7327		GE SPREADING AREA	n- 22
7327 0 <b>09-</b> SEWA 5760	GE DIGESTER SLUC GS-86-9116	GE SPREADING AREA  Boring 009-81, 0-1'	H-34
7327 009-SEWA 5760 5761	GE DIGESTER SLUC	Boring 009-B1, 0-1' Boring 009-B1, 1'-2'	H-34 H-34
7327 009-SEWA 5760 5761 5762	GE DIGESTER SLUD GS-86-9116 GS-86-9117 GS-86-9118	Boring 009-81, 0-1' Boring 009-81, 1'-2' Boring 009-81, 1'-2' Duplicate	H- 34 H- 34 H- 34
7327 009-SEWA 5760 5761 5762 5763	GE DIGESTER SLUC GS-86-9116 GS-86-9117 GS-86-9118 GS-86-9119	Boring 009-B1, 0-1' Boring 009-B1, 1'-2' Boring 009-B1, 1'-2' Duplicate Boring 009-B2, 0-1'	H- 34 H- 34 H- 34 H- 34
7327 009-SEWA 5760 5761 5762 5763 5764	GE DIGESTER SLUC GS-86-9116 GS-86-9117 GS-86-9118 GS-86-9119 GS-86-9120	Boring 009-B1, 0-1' Boring 009-B1, 1'-2' Boring 009-B1, 1'-2' Duplicate Boring 009-B2, 0-1' Boring 009-B2, 1'-2'	H- 34 H- 34 H- 34 H- 34
7327 009-SEWA 5760 5761 5762 5763 5764 5765	GE DIGESTER SLUC GS-86-9116 GS-86-9117 GS-86-9118 GS-86-9119 GS-86-9120 GS-86-9121	Boring 009-B1, 0-1' Boring 009-B1, 1'-2' Boring 009-B1, 1'-2' Duplicate Boring 009-B2, 0-1' Boring 009-B2, 1'-2' Boring 009-B3, 0-1'	H- 34 H- 34 H- 34 H- 34 H- 34
7327 009-SEWA 5760 5761 5762 5763 5764	GE DIGESTER SLUC GS-86-9116 GS-86-9117 GS-86-9118 GS-86-9119 GS-86-9120	Boring 009-B1, 0-1' Boring 009-B1, 1'-2' Boring 009-B1, 1'-2' Duplicate Boring 009-B2, 0-1' Boring 009-B2, 1'-2'	H-34 H-34 H-34 H-34

Table H-1 (Cont.)

Lab Number	Field Number		Description	Page
009-SEWAGE	DIGESTER SLUDGE	SPREADING AREA	(Cont.)	
5768	GS-86-9124	Boring 009-B4,	1'-2'	H- 346
5769	GS-86-9125	Boring 009-B5,	0-1'	H-346
5770	GS-86-9126	Boring 009-B5,	1'-2'	H-346
5771	GS-86-9127	Boring 009-86,	0-1'	H- 346
5772	GS-86-9128	Boring 009-B6,	1'-2'	H-347
5773	GS-86-9129	Boring 009-87,	0-1'	H- 347
5774	GS-96-9130	Boring 009-B7,	1'-2'	H-347
5775	GS-86-9131	Boring 009-88,	0-1'	H= 347
5776	GS-86-9132	Boring 009-88,	1'-2'	H-347
5777	GS-86-9133	Boring 009-89,	0-1'	H- 347
5778	GS-86-9134	Boring 009-89,	0-1' Duplicate	H-347
5779	GS-86-9135	Boring 009-89,	1'-2'	H- 347
5780	GS-86-9136	Boring 009-810	, 0-1'	H-347
5 781	GS-86-9137	Boring 009-B10	, 1'-2'	H-347



Table H-2

REESE AFB PHASE II STAGE 1
ANALYTICAL METHODS, DETECTION LIMITS, AND HOLDING TIMES

Parameter	Method	Detection Limit	Holding Time
Purgeable Organic Compounds	SW8010 & SW8020 E601 & E602	1 mg/kg a	14 days
Pesticides/PCBs and Herbicides	SW3550, then SW8080		Extracted within 7 days; analyzed within following 30 days.
	SW8150 E608, SW8140 and A5098	1 mg/kg a	Extracted within 7 days; analyzed within following 40 days.
Base/Neutral/ Acids Extractable	SW3550, then SW8270 E625	1 mg/kg a	Extracted within 14 days, analyzed within following 40 days.
Oil & Grease	E413.2 (modified for soils)	100 ug/g	28 days
(using IR)	E413.2	200 ug/L	
Petroleum Hydrocarbons	E418.1 (modified for soils)	10 mg/kg	28 days
Polynuclear Aromatic Hydrocarbons	SW3550, then SW8110	а	Extracted within 7 days, analyzed within following 30 days
Phenols	SE3550, then SW8049 E604	a a	Extracted within 7 days, analyzed within following 30 days.
Total Dissolved Solids (TDS)	E160.1	1 mg/l	7 days
Metals, Primary	SW3050, then SW6010 £200.7	a a	No recommended holding time
Arsenic	SW3050, then SW7060	0.1 mg/kg	No recommended holding time
Cadmium	SW3050, then SW7130	0.5 mg/kg	No recommended holding time
Chromium	SW3050, then SW7190	5 mg/kg	No recommended holding time
Copper	SW3050, then SW7210	2 mg/kg	No recommended holding time
Lead	SW3050, then SW7420	10 mg/kg	No recommended holding time
Nickel	SW3050, then SW7520	0.4 mg/kg	No recommended holding time



Table H-2 (Cont.)

Parameter	Method	Detection Limit	Holding Time
Zinc	SW3050, then SW7950	0.05 mg/kg	No recommended holding time
рH	£150.1		No recommended holding time
EP Toxicity (Metals)	SW Manual	b	No recommended holidng time
Ignitability	SW1010	c	No recommended holding time

a) Detection limits as specified by the applicable EPA or Standard Method.

b) <u>Metal</u>	ug/L leaching solution
As Ba Cd	0.002 0.1 0.005
Cr Hexavalent Cr Pb Hg Se Aq	0.05 0.05 0.1 0.0002 0.002

c) Test for ignitability. If positive, it is a hazardous waste, in accordance with 40 CFR 261.21.

### CORRECTING WET WEIGHT TO DRY WEIGHT

To correct the wet weight sample result to dry weight, the result must be divided by the percent solids (expressed in decimal form).

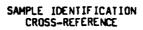
FOR EXAMPLE:

A sample is 65% solids.

 $\frac{15 \text{ mg/kg as received}}{0.65 \text{ (Solids)}} = 23 \text{ mg/kg dry weight}$ 

KS/10

	,	ICATION ENCE  U-3615  Field Location		
	SAMPLE IDENTIF: CROSS-REFERE	ICATION ENCE		
<del> </del>	·	U-3615	1	
Laboratory Number 86-	Field Number	Field Location		
4974A	9001	0165-S0-001-GS-86-9001	<u>.</u>	
4975	9002	0165-S0-001-GS-86-9002	. A	
4976	9003	0165-S0-001-GS-86-9003		
4977	9004	0165-S0-001-GS-86-9004		
4978	9025	0165-SD-002-GS-86-9025		-74
4.)79	9026	0165-S0-002-GS-86-9026		
4980	9047	0165-S0-006-GS-86-9047		
4981	9048	0165-50-006-09-86-9048		
4982	9005	0165-NP-001-GN-86-9005		
4983	9006	0165-NP-001-GN-86-9006		
			:	
	н-10			



U-3801.3

Laboratory Number 86-	Field Number	Field Location
5911	9005	0165-NP-001-GN-86-9005

# SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3615.1

					 		_			 
	/8 is	Anal	;	7/24						
/E+30)	Analysis	Dead		1/31						
Phenols (7/E+30)	Extraction	Ext	:	1//1						
됩	Extra	Dead	:	7/3						
	Analysis	Dead Anal	1/3	7/3						
(7/5+14	Anal	Dead	7/10	7/10						
Organophos(7/5+14)	Extraction	Ext	1//	1/1						
티	Extra	Dead	٤/١	٤/٢						
	Analysis	Anal	6/1	6/L						
Pest/PCB(7/E+40)	Anal	Dead Extr Dead Anal	8/10	8/10						
st/PCB(	Extraction	Extr	1/1	1/1						
   왕	Extra	Dead	7/3	1/3						
	Analysis	Dead Anal	7/3	7/3						
/E+30)	Anal	Dead	1/31	1/31		<b>1</b>	on Date	1//1		
Herb(7/E+30)	Extraction	Extr	1/1	1/1		Pest/PC	Confirmation			
	Extra	Dead Extr	7/3	7/3			5	4979		
	V0A(14)	Dead Anal	7/10 6/30 <b>,</b>	6/30, 7/2						
			7/10	7/10			n Date	7/1	1/1	
	Samole	Date	6/26	6/26		VOV	Confirmation Date			
	Semone	Number	4982	4983			Š	4982	4983	
	Ę	300	3615			_				 

DEAD: EXTR: ANAL: ( ): S+#: E+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time expires.
Holding time based on sample date.
Holding time based on sample extraction.

THE PARTY WILLIAM SOUTH WITHOUT PRESENT POWERS AND STREET

\$3333 SECTION



# SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3615.2

				PAH (7/	PAH (7/5 + 30)		_,	BNA(7/E + 40)	+ 40							
í	al comp		Extra	Extraction	Analysis	yeis	Extra	Ext ract ion	Analysis	yeis	105	TDS (7)	086	0&G(28)	Pet.	Pet. HC(28)
3	Number	Date	Dead	Dead Extr	Dead Anal	Anel	Dead	Extr	Dead Extr Dead Anal	Anal	Dead	Dead Anal	Dead Anal	Anal	Dead Anal	Anel
3615	4982	97/9	-	-	:	1	1//3	1/2 8/1	8/10 7/2	1//2	7/3	1//	7/24	7/15	;	
1	4983	6/26	1	;	1	-	7/3	1/1	8/10	1/2	3/13	7/1 1/24		7/15	1	
<u></u>																

DEAD: EXTR: ANAL: ( ): S+f: E+f:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time.
Holding time expiration based on sample date.
Holding time expiration based on sample date.

# SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

						Harb( 1/E+	/£+30)		ēl	Pest/PCB(7/E+40)	7/E+40)		Orgi	soudous	Organophos (7/5+14)		E	Phenols (7/E+30)	(E+30)	
				V0A(14)	Extra	Extraction	Analysis	1818	Extraction	ct ion	Analysis	818	Extraction	tion	Anelysis	/8 is	Extraction	tion	Analysis	/8 i 8
g	Number	Dete	Dead	Anal	Dead	Extr	Dead	Anal	Dead	Extr	Dead	Anal	Dead	Extr	Dead	Anal	Dead	Anal	De 90	Anal
3615	4974A	6/26	1	95		1/1	1/31	1/1	1//5	1/1	8/10	1/9	1/3	1/1	1/10	1/3	-	:	:	:
	4975	97/9	1/10		1/3	1/1	1/31	1/1	1/3	1/1	8/10	1/9	7/3	1/1	1/10	1/3	1	1	1	:
	4976	6/26	7/10		1/3	1//	1/31	1/1	1/3	1/1	8/10	2/9	1/3	1//	7/10	1/3	;		-	:
	4977	6/26	7/10		1/3	1//	1/31	1/1	1/3	1/1	8/10	6/1	1/3	1/1	7/10	1/3	-		1	:
	4978	6/26	7/10	6/2		1//	16/1	1/1	1/3	1/1	8/10	6/1	1/3	1/1	1/10	1/3			1	:
	4979	6/26	1/10		1/3	1//	1/31	1/1	1/3	1/1	8/10	6/1	7/3	1/1	7/10	1/3	-		1	:
	4980	6/26	2/10		7/3	1//	1/31	1/1	1/3	1/1	8/10	6/1	1/3	1/1	7/10	1/3	:		1	:
	4981	6/26	7/10	6,2/5	1/3	1/1	1/31	1/1	1/3	1/1	8/10	1/9	1/3	1//	1/10	1/3	1	-	1	-
														•						
		Config	Confirmation Date	Date				·												
	4974A		7/8																	
	4975		7/8																	

H-14

DEAD: EXTR: ANAL: ( ): S+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time.
Holding time expiration based on sample date.
Holding time expiration based on extraction date.



g,v

SAMPLE FRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3615.4

				PAH (7/5 + 30)	5 + 30)		_,	BNA( 14/	BNA(14/E + 40)							
į	į		Extra	Extraction	Anel	Analysis	Extraction	ct ion	Anal	Analysis	103	TDS (7)	98	046(28)	Pet.	Pet. HC(28)
	Number	Date	Dead	Extr	Dead	Dead Anal	Dead	Dead Extr	Dead	Anel	Dead	Anel	Dead	Anel	Dead	Anal
3615	4974A	97/9	:	:		:	7/10	1/1	8/10	1//1	:		7/24	1/23	:	:
	4975	6/26		;	-	:	7/10	1/1	8/10	1/3	- :	ì	7/24	7/23	1	:
	4976	97/9	-	1	-	:	7/10	1/1	8/10	7/9	-	:	7/24	7/23		1
	4977	97/9	:	ŀ	-	:	7/10	1/1	8/10	7/3	:	;	7/24	7/23	-	:
	4978	97/9	:	•		;	7/10	1/1	8/10	1/3	-	-	7/24	7/23	;	:
	4979	97/9		:	-	:	01/1	1/1	8/10	7/3	:	:	7/24	7/23	:	:
	4980	97/9	•	1	:	:	7/10	1/1	8/10	1/3	:	:	7/24	7/23	-	:
	4981	97/9	;	;	-	:	7/10	1/1	8/10	1/3	:		7/24	7/23	-	:

DEAD: EXTR: ANAL: S+F: E+F:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time expires.
Holding time based on sample date.
Holding time based on sample extraction.

	TIMES
	HOLDING
	SES REQUIRING HOLDIN
ZAZZ	-
	AR

			_		1	
U-5801		Analysis	Anel	15/2		_
-	/E+30)		Dead	8/24		Phenol Confirmation Date 8/20
	Phenola(7/E+30)	Extraction	Extr	1/31		Confi
	ξl	Extra	Deed Extr Deed Anal	8/5		5 <del>9</del> 1
•		7818				
	7/5+14	Analysis	Dead	1		
	Organophos(7/S+14)	Extraction	Dead Extr Dead Anal	1		
	OLO GLO	Extra	Dead	1		
		(818	Anel	1		
	7/E+40)	Analysis	Dead	i		
	Pest/PCB(7/E+40)	tion	Dead Extr Dead Anel	1		
	<b>.</b>	Extraction	Dead	1		
		818	lead Anal	1		
	/E+30)	Analysis	Dead	1		
	Herb(7/E+30)	ction	Extr	1		
		Extraction	Dead Extr	ı		
		V0A(14)	Dead Anal	1		
		VO V	Dead	1		
		Seenle	Date	7/29		
		, canol	Number	1165		
			3	U-3801	· · · · · · · · · · · · · · · · · · ·	H-16

DEAD: EXTR: ANAL: ( ): S+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time expires.
Holding time based on sample date.
Holding time based on sample extraction.



### LABORATORY REPORT

FOR

### REESE AIR FORCE BASE

U-3615.5

Job No.: U-3615			RE:	DF-2000	
305 10 0-3013					
Sample Date: 6/26/8	6		P.O. No.:		
Date Received: 6/27/8	6		Sampled B	y: E&E, In	ıc.
Sample Type: Water			Delivered	By: Federal E	xpress
E & E Lab. No. 86-	4982	4983	Blank		
Customer No.	9005	9006			
Sample Identity					
	Results i	n: mg/L			
Oil and Grease Cadmium Chromium Copper Lead Nickel Zinc Total Dissolved Solids	2.4 <0.005 <0.01 <0.02 0.010 <0.02 0.015 130	3.5 <0.005 <0.01 <0.02 <0.005 <0.02 <0.01 150	NA <0.005 <0.01 <0.02 <0.005 <0.02 <0.01 NA		

NA: Not applicable

Analytical References:

"Methods for the Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March, 1983.

Supervising Analyst: Alle Mith 1835

Date: (1876)



### LABORATORY REPORT

### FOR

### REESE AIR FORCE BASE

U-3615.6

Job No.: U-3615			RE:	DF-20	00	
Sample Date: 6/26/8	6		P.O. No.:			
Date Received: 6/27/8	6		Sampled 8	y: E&E	, Inc.	
Sample Type: Soil			Delivered	By: Feder	al Express	
E&E Lab. No. 86-	49 74 A	49 75	49 76	4977	4978	
Customer No.	9001	9002	9003	9004	9025	
Sample Identity						
	Results i	n: mg/kg a	s received		<del></del>	
Oil and Grease Solids, %	10,200 85	9630 80	1610 60	160 70	<100 71	

### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst:

Date:



### LABORATORY REPORT

### FOR

### REESE AIR FORCE BASE

U-3615.7

	<del></del>					·	
Job No.: U-3615	Job No.: U-3615			DF-20	000		
Sample Date: 6/26/86			P.O. No.:				
Date Received: 6/27/8	6		Sampled E	By: E&E	, Inc.		
Sample Type: Soil			Delivered	By: Feder	ral Express		
E & E Lab. No. 86-	4979	4980	4981	Blank*			
Customer No.	9026	9047	9048				
Sample Identity							
	Results i	n: mg/kg a	s received		<del></del>	<del> </del>	
Oil and Grease Chromium Lead Solids, %	600 NR NR 55	160 11.4 10.0 64	<100 11.7 8.82 70	NA <0.01 <0.005 NA			

Not applicable mg/L Analysis not requested

### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst:



# RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT BASE/NEUTRAC EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/L)

	E & E Lab. No. 86-	49 82	4983	Blank		
Compound	Sample Identity	9005	9006			
bis(2-chloroethyl)ether		<10	<10	<10		
1,3-dichlorobenzene		<10	<10	<10	ļ	l
1,4-dichlorobenzene		<10	<10	<10	į	
1,2-dichlorobenzene		<10	<10	<10	ł	
bis(2-chloroisopropyl)ether		<10	<10	<10		
N-nitrosodipropylamine		<10	<10	<10		ł
hexachloroethane		<10	<10	<10		
nitrobenzene		<10	<10	<10		ı
isophorone		<10	<10	<10	1	ł
bis(2-chloroethoxy)methane		<10	<10	<10	ł	
1,2,4-trichlorobenzene		<10	<10	<10		1
naphthalene		<10	<10	<10		Ì
hexachlorobutadiene		<10	<10	<b>1</b> <10		
hexachlorocyclopent ediene		<10	<10	<10		
2-chloronaphthalene		<10	<10	<10	1	1
dimethyl phthalate		<10	<10	<10		
acenaphthylene		<10	<10	<10	ł	
fluorene		<10	<10	<10	1	1
acenaphthene		<10	<10	<10		}
2,4-dinitrotoluene		<10	<10	<10	1	
2.6-dinitrotoluene		<10	<10	<10		Ì
diethylphthalate		<10	<10	<10		
4-chlorophenyl phenyl ether		₹10	√10 -<10	<10	ļ	l .
N-nitrosodiphenylamine		<10	<10	<10		
4-bromophenyl phenyl ether		<10	<10	<10	ł	ļ
hexachlorobenzene		<10	<10	<10		1
phenanthrene		<b>&lt;10</b>	<10	<10	1	ļ
ant hracene		<10	<10	<10		i
di-n-butyl phthalate		<10	<10	<10		1
fluoranthene		<10	<10	<10	ļ	İ
benzidine		<50	<50	<50	[	Į.
pyrene		<10	<10	<10		
butyl benzyl phthalate		<10	<10	<10		ŀ
3,3'-dichlorobenzidine		<30	<30	<30		l
benzo(a)anthracene		<10	<10	<10		1
bis(2-ethylhexyl)phthalate		<10	<10	<10		
chrysene		<10	<10	<10		
di-n-octyl phthalate		<10	<10	<10	}	
benzo(b)fluoranthene		<10	<10	<10	ŀ	1
benzo(k)fluoranthene		<10	<10	<10	1	1
benzo(a)pyrene		<10	<10	<10	ł	1
indeno(1,2,3-cd)pyrene		<10	<10	<10	1	1
dibenzo(a,h)anthracene		<10	<10	<10	1	1
benzo(ghi)perylene		<10	<10	<10	1	1
20.20(9.2/201/201/0		`'	`''	1	1	]

X P	5i A N A 1	ECOLOGY AND			NTER		
	RESULT	S OF WATER ANAL	LYSIS FOR P BLE COMPOUN	RIORITY POL DS BY GC/MS	LUTANT		
		(all r	esults in u	g/L)			
-			<del></del>	<del></del>	<del> </del>	 U-3615.9	
		E & E Lab. No. 86-	4982	4983	Blank		
	Compound	Sample Identity	9005	9006	_		
	phenol 2-chlorophenol 2-nitrophenol	-	<10 <10 <10	<10 <10 <18	<10 <10 <10		
	2,4-dimethylphenol 2,4-dichlorophenol		<10 <10	<10 <10	<10 <10		
	4-chloro-3-methylphenol 2,4,6-trichlorophenol		<10 <10	<10 <10	<10 <10		
	2,4-dinitrophenol 4-nitrophenol		<30 <10	<30 <10	<30 <10		
•	4,6-dinitro-2-methylphenal pentachlorophenol		<30 <30	<30 <30	<30 <30		
K.							
		**					
•							

# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY OF SURROGATE SPIKES

U-3615.10

	E&E	Amount Added	Amount Determined	
Compound	Laboratory No. 86-	(u	ıg/L)	Percent Recovery
nitrobenzene-D5	49 82	100	65	65
	49 83	100	75	75
2-fluorobiphenyl	4982	100	87	87
	4983	100	164	104
terphenyl-D14	4982	100	80	80
	4983	100	144	144
phenol-D5	49 82	200	42	21
	49 83	200	54	27
2-fluorophenol	4982	200	86	43
	4983	200	109	54.5
2,4,6-tribromophenol	4982	200	188	94
	4983	200	179	89.5

These recoveries are acceptable to  $\ensuremath{\mathsf{EPA}}$  Contract Lab Program (CLP) guidelines.

\$355500 | \$2555500 | \$6555500 | \$2555500 | \$2555500 | \$2555500 | \$2555500 | \$2555500 | \$2555500 | \$2555500 | \$

# RESULTS OF SOIL ANALYSIS FOR PHENOL COMPOUNDS BY GC/MS\*

(all results in mg/kg as received)

	E & E Lab. No. 86-	4980	4981			
Compound	Sample Identity	9047	9048			
phenol		<1	<1			
2-chlorophenol	ì	<b>&lt;</b> 1	<1	ł		Í
2-nitrophenol		<1	<1		1	
2,4-dimethylphenol	ļ	<1	<1	1	1	
2,4-dichlorophenol	į	<1	<1		1	
4-chloro-3-methylphenol	į	<1	<1		1	
2,4,6-trichlorophenol		<1	<1			1
2,4-dinitrophenol		<3	<3		1	<b>!</b>
4-nitrophenol		<1	<1		l	ŀ
4,6-dinitro-2-methylphenol	ļ	<3	<3		ł	
pentachlorophenol	•	<3	<3	)	1	}

<sup>\*</sup>Samples analyzed by GC/MS instead of by GC.

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

	E & E Lab.	40.74.4	40.75	4076	40.77	40.70
İ	No. 86-	<b>49</b> 74A	4975	4976	4977	49 78
Compound	Sample Identity	9001	9002	9003	9004	9025
bis(2-chloroethyl)ether		<1	<1	<1	<b>&lt;</b> 1	<1
1,3-dichlorobenzene	l	<b>&lt;</b> 1	<1	<u> </u>	<1	<1
1,4-dichlorobenzene		<u> </u>	\ \z\(\frac{1}{2}	ζ1	<1	₹1
1,2-dichlorobenzene		<u> </u>	<b>i</b>	<1	<u> </u>	<1
bis(2-chloroisopropyl)ether		<u> </u>	\ \cdot \cdo	₹1	<1	₹1
N-nitrosodipropylamine	ì	<b>3</b> 1	<1	<1	<u> </u>	<u>&lt;1</u>
hexachloroethane	l	<b>\ \cdot</b> 1	\ \cdot\( i \)	<b>₹1</b>	₹1	<b>\(\)</b> 1
nitrobenzene		<b>\ \cdot</b>	₹1	ξ1	₹1	₹1
isophorone		<1	₹1	\ \cdot\( 1 \)	\ \cdot i	₹1
bis(2-chloroethoxy)methane		<b>&lt;1</b>	<b>\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ </b>	\ \di	\ \cdot\(\frac{1}{2}\)	₹1
1,2,4-trichlorobenzene		<b>\ \cdot</b> 1	\ \cdot\( \cdot\)	. (1	₹1	₹1
naphthalene		6.0	2.0	` <b>\</b> {1	₹1	<1
hexachlorobutadiene		<1	∠.0 <1	\ \cdot\{\frac{1}{2}}	\ \dirac{1}{21}	\ \d
hexachlorocyclopentadiene		<b>\ \cdot\1</b>	\ \cdot\( \cdot\)	\ \cdot\( 1	\ \cdot\( \cdot\)	<1
2-chloronaphthalene		\ <b>\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ </b>	₹1	\ \d	\ \{1	<b>\</b>
dimethyl phthalate		<b>&lt;</b> 1	<b>&lt;</b> 1	\ \d	\ \d	<b>\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ </b>
acenaphthylene		\ \di	\ \di	\ \cdot\(\frac{1}{21}\)	\ \cdot\ 1	₹1
fluorene		<b>&lt;1</b> *	₹1	₹1	₹1	<1
acenaphthene		<1	\ \d	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	\ \di	<1
2,4-dinitrotoluene		\ \<1	<b>&lt;</b> 1	<1	<u> </u>	<1
2,6-dinitrotoluene		\ <b>\ \ \ \ \ \ \ \</b>	\ \d	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	\ \z\ 1	<1
) ·		<1	<1	<b>&lt;</b> 1	<1	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
diethylphthalate 4-chlorophenyl phenyl ether		\ \d	<1	<1	\ <b>\ \ \ \ \ \</b> 1	<1
N-nitrosodiphenylamine		<b>\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ </b>	<b>\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ </b>	<b>\(\)</b> 1	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	<1
		<1	<b>&lt;1</b>	<b>&lt;1</b>	<1	<1
4-bromophenyl phenyl ether hexachlorobenzene		<1	<1	<b>&lt;1</b>	<1	<1
phenant hrene		2.0	<1 <del>*</del>	<1	<1	<1
		2.0 <1*	<1	<b>1</b>	<1	<1
anthracene		<1*	<b>(1</b>	<1	<1 <1	<1
di-n-butyl phthalate fluoranthene		4.4	<1*	<1	<1	<1
benzidine		<b>4.4</b> <b>(5</b>	(5	(5	(5	(5
N .		2.7	<1*	<u> </u>	<1	<b>(1</b>
pyrene		<1*	(1)	<1	<1	<1
butyl benzyl phthalate 3,3'-dichlorobenzidine		(3	3	3	3	3
benzo(a)anthracene		1.5	(1	(1	(1)	<1
bis(2-ethylhexyl)phthalate		4.0	1.1	3.2	<1	<1
chrysene chrysene		1.8	<1*	3.4 <1	<1	<1
di-n-octyl phthalate		<1	<1	<1	<b>&lt;1</b>	<1
benzo(b)fluoranthene		1.1	<1*	. <1	<b>\(\)</b> 1	<1
benzo(k)fluoranthene		<1	<1	<1	<1 <1	<1
benzo(k)flugranthene		<1*	<1	<1 <1	<1 <1	
		l	t			<1
indeno(1,2,3-cd)pyrene		<1	<1	<1	<1	<1
dibenzo(a,h)anthracene		<1 <1	<1	<1	<1	<1
benzo(ghi)perylene		\ `'	<1	<1	<1	<1

<sup>\*</sup>Compound present below measurable detection limit.

# RESULTS OF SOIL ANALYSIS FOR PRIDRITY POLLUTANT BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS (Cont.)

(all results in mg/kg, as received)

U-3615.13

PLANCE NOTES BETTER TRIVES TO THE

bis(2-chloroethyl)ether 1,3-dichlorobenzene 1,4-dichlorobenzene 1,2-dichlorobenzene 1,2-dichlorobenzene bis(2-chloroisopropyl)ether N-nitrosodipropylamine hexachloroethane nitrobenzene isophorone bis(2-chloroethoxy)methane 1,2,4-trichlorobenzene naphthalene hexachlorocyclopentadiene 2-chlorosphthalene dimethyl phthalate acenaphthene 2,4-dinitrotoluene 2,6-dinitrotoluene diethylphthalate 4-chlorophenyl phenyl ether	ple ntity	9026				
1,3-dichlorobenzene 1,4-dichlorobenzene 1,2-dichlorobenzene bis(2-chloroisopropyl)ether N-nitrosodipropylamine hexachloroethane nitrobenzene isophorone bis(2-chloroethoxy)methane 1,2,4-trichlorobenzene naphthalene hexachlorobutadiene hexachlorocyclopentadiene 2-chloromaphthalene dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene diethylphthalate						
1,4-dichlorobenzene 1,2-dichlorobenzene bis(2-chloroisopropyl)ether N-nitrosodipropylamine hexachloroethane nitrobenzene isophorone bis(2-chloroethoxy)methane 1,2,4-trichlorobenzene naphthalene hexachlorobutadiene hexachlorocyclopentadiene 2-chloronaphthalene dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene diethylphthalate			<1			
1,2-dichlorobenzene bis(2-chloroisopropyl)ether N-nitrosodipropylamine hexachloroethane nitrobenzene isophorone bis(2-chloroethoxy)methane 1,2,4-trichlorobenzene naphthalene hexachlorobutadiene hexachlorocyclopentadiene 2-chloronaphthalene dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene diethylphthalate		<1	<1			
bis(2-chloroisopropyl)ether N-nitrosodipropylamine hexachloroethane nitrobenzene isophorone bis(2-chloroethoxy)methane 1,2,4-trichlorobenzene naphthalene hexachlorobutadiene hexachlorocyclopentadiene 2-chloronaphthalene dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene diethylphthalate	1	<1	<1			
N-nitrosodipropylamine hexachloroethane nitrobenzene isophorone bis(2-chloroethoxy)methane 1,2,4-trichlorobenzene naphthalene hexachlorobutadiene hexachlorocyclopentadiene 2-chloronaphthalene dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene diethylphthalate	1	<b>K1</b>	<1			
hexachloroethane nitrobenzene isophorone bis(2-chloroethoxy)methane 1,2,4-trichlorobenzene naphthalene hexachlorobutadiene hexachlorocyclopentadiene 2-chloronaphthalene dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene diethylphthalate	ì	<1	<1			
hexachloroethane nitrobenzene isophorone bis(2-chloroethoxy)methane 1,2,4-trichlorobenzene naphthalene hexachlorobutadiene hexachlorocyclopentadiene 2-chloronaphthalene dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene diethylphthalate	ł	<1	<1			
isophorone bis(2-chloroethoxy)methane 1,2,4-trichlorobenzene naphthalene hexachlorobutadiene hexachlorocyclopentadiene 2-chloronaphthalene dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene diethylphthalate	ì	<1	<b>&lt;1</b>			
bis(2-chloroethoxy)methane 1,2,4-trichlorobenzene naphthalene hexachlorobutadiene hexachlorocyclopentadiene 2-chloronaphthalene dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene diethylphthalate	ļ	<1	<1			
1,2,4-trichlorobenzene naphthalene hexachlorobutadiene hexachlorocyclopentadiene 2-chloronaphthalene dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene diethylphthalate		<u> </u>	<b>K</b> 1			
1,2,4-trichlorobenzene naphthalene hexachlorobutadiene hexachlorocyclopentadiene 2-chloronaphthalene dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene diethylphthalate	1	<1	<1		'	
naphthalene hexachlorobutadiene hexachlorocyclopentadiene 2-chloronaphthalene dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene diethylphthalate	1	<b>k</b> 1	<1			
hexachlorobut adiene hexachlorocyclopent adiene 2-chloronaphthalene dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene diethylphthalate	1	<1	<b>K1</b>			
2-chloronaphthalene dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene 2,6-dinitrotoluene diethylphthalate	ŀ	<b>₹1</b>	ζ1		i	
2-chloronaphthalene dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene 2,6-dinitrotoluene diethylphthalate	ŀ	<b>21</b>	ζί			
dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene 2,6-dinitrotoluene diethylphthalate	1	21	<u>&lt;1</u>			
acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene 2,6-dinitrotoluene diethylphthalate		₹1	<u> </u>			
fluorene acenaphthene 2,4-dinitrotoluene 2,6-dinitrotoluene diethylphthalate	·	<b>&lt;1</b>	<1			
2,4-dinitrotoluene 2,6-dinitrotoluene diethylphthalate	{	<b>₹</b> 1	<1			
2,4-dinitrotoluene 2,6-dinitrotoluene diethylphthalate	ł	\display	<u> </u>			
2,6-dinitrotoluene diethylphthalate	ļ	<b>21</b>	<1			
diethylphthalate	ł	\di	<u> </u>			
	j	\di	<b>&lt;</b> 1			
		31	<b>~</b> 1			
N-nitrosodiphenylamine	i	31	<1	1		
4-bromophenyl phenyl ether	Ì	<b>21</b>	<b>ķ</b> i	1		
hexachlorobenzene	Ì	₹1	<u> </u>	ĺ		
phenant hr ene	1	<b>31</b>	<u> </u>		(	
anthracene	}	3	<b>₹1</b>	}		•
di-n-butyl phthalate	i	<b>₹1</b>	<1			
fluoranthene	1	<b>₹1</b>	<b>\cdot\(\delta\)</b>			
benzidine	1	<b>₹</b> 5	<b>₹</b> 5	[		
pyrene	1	<1	<b>(1</b>		1	
butyl benzyl phthalate	ì	<b>3</b> 1	<b>č</b> 1		ļ	
3,3'-dichlorobenzidine	1	<i>(</i> 3	ζ3	ĺ	İ	
benzo(a) anthracene	1	<b>1</b>	<1	ł		
bis(2-ethylhexyl)phthalate	<b>[</b>	3	<1			
chrysene	ł	31	<b>1</b>			
di-n-octyl phthalate	[	₹1	<b>&lt;</b> 1			
benzo(b)fluoranthene	i	<b>21</b>	\ \cdot 1	1		
benzo(k)fluoranthene	1	<b>&lt;</b> 1	<b>&lt;</b> 1			
benzo(a)pyrene	i	<b>21</b>	<b>?i</b>	1	ĺ	
indena(1,2,3-cd)pyrene	1	<b>₹1</b>	ξi ]	1		
dibenzo(a,h)anthracene	ſ	31	\hat{1}	1	1	
benzo(ghi)perylene	l	31	<b>&lt;</b> 1	1	1	



# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

	E & E Lab. No. 86-	4974A	4975	4976	4977	4978
Compound	Sample Identity	9001	9002	9003	9004	9025
phenol		<1	<1	<1	<1	<1
2-chlorophenol		<1	<1	<1	<1	<1
2-nitrophenol		<1	<1	<1	<1	<1
2,4-dimethylphenol	(	<1	<1	<1	<1	<1
2,4-dichlorophenol		<1	<1	<1	<1	· <1
4-chloro-3-methylphenol		<1	<1	<1	<1	<1
2,4,6-trichlorophenol		<1	<1	<1	<1	<1
2,4-dinitrophenol		<3	<3	<3	<3	(3
4-nitrophenol		<1	<1	<1	<1	<1
4,6-dinitro-2-methylphenol	į	<3	<3	<3	<3	<3
pentachlorophenol		<3	<3	<3	<3	<3

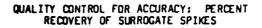


# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

	E & E Leb. No. 86- 4979 Blan	81ank				
Compound	Sample Identity	9026				
phenol		<b>&lt;</b> 1	<1			
2-chlorophenol	ĺ	<1	<1			
2-nitrophenol		<1	<1			
2,4-dimethylphenol		<1	<1	}		
2,4-dichlorophenol		<1	<1			
4-chloro-3-methylphenol		<1	<1	1		j
2,4,6-trichlorophenol		<1	<1	i i		
2,4-dinitrophenol	i	<3	<3	ì		
4-nitrophenol		<1	<1	<b>!</b>		
4,6-dinitro-2-methylphenol	1	<3	<3	1		
pent achlorophenol		<3	<3	j	İ	



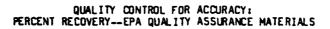


U-3615.16

	E&E	Amount Added	Amount Determined		
Compound	Laboratory No. 86-	(mg	/kg)	Percent Recovery	
nitrobenzene-05	49 74 A	3.3	2.3	70	
nitrobenzene-05	4975	3.3	Z.J	/ <u>-</u> -	
	4976	3.3	1.2	36	
	4977	3.3	1.7	52	
	4978	3.3	1.8	55	
	4979	3.3	1.6	48	
2-fluorobiphenyl	4974A	3.3	2.7	82	
_ /	4975	3.3	**		
	4976	3.3	2.1	64	
	4977	3.3	3.1	94	
	4978	3.3	3.1	94	
	4979	3.3	2.9	88	
terphenyl-D14	4974A	3.3	1.9	58	
•	4975	3.3	<b>*</b>		
	4976	3.3	1.8	55	
	49,77	3.3	2.9	88	
	4978	3.3	3.4	103	
	49 79	3.3	2.5	76	
phenol-D5	4974A	6.6	2.4	36	
	4975	6.6	•		
	4976	6.6	1.2	18	
	4977	6.6	1.8	27	
	4978	6.6	1.7	26	
	4979	6.6	1.6	24	
2-fluorophenol	4974A	6.6	2.3	35	
	49 75	6.6			
	4976	6.6	*	<del></del>	
	4977	6.6	1.5	23	
	4978	6.6	1.6	24	
	4979	6.6	•		
2,4,6-tribromophenol	49 74 A	6.6	3.6	55	
-	4975	6.6			
	4976	6.6	2.9	44	
	4977	6.6	3.1	47	
	4978	6.6	4.7	71	
	4979	6.6	4.4	67	

\*<1 mg/kg recovered.

Note: Insufficient sample size remaining for reextraction of sample 4975, poor recoveries believed due to matrix interferences. Reextraction of several samples demonstrated matrix interferences with phenol-D5 and 2-fluorophenol recoveries (24% minimum acceptable recoveries for EPA Contract Lab Program). All other recoveries are within the acceptable range.



U-3615.17

Compound	True Value (ug/L)	Amount Determined (ug/L)	Percent Recovery
bis(2-chloroethyl)ether	48 - 2	45.3	94.0
1,3-dichlorobenzene	52.0	37.0	71.2
1,2-dichlorobenzene	24.7	17.6	71.3
N-nitrosodi-n-propylamine	34.8	27.8	79.9
isophorone	76.7	79.5	104
bis(2-chloroethoxy)methane	48.6	44.1	90.7
1,2,4-trichlorobenzene	25.3	18.8	74.3
hexachlorobut adiene	49.6	28.5	57.5
2-chloronaphthalene	25.4	26.1	103
2,6-dinitrotoluene	76.5	81.7	107
2,4-dinitrotoluene	73.8	71.3	96.6
diethyl phthalate	25.1	15.5	61.8
hexachlorobenzene	35.7	39.2	110
phenant hr ene	. 40.2	41.9	104
dibutylphthalate	24.9	21.4	85.9
pyrene	60-2	65.6	109
benzo(a)anthracene	73.9	74.8	101
di-n-octylphthalate	43.9	38.4	87.5
benzo(k)fluoranthene	45.7	30.4	66.5

These recoveries are acceptable with EPA guidelines.

### QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY--EPA QUALITY ASSURANCE MATERIALS

U-3615.18

Compound	True Value (ug/L)	Amount Determined (ug/L)	Percent Recovery
2-chlorophenol	30	20	67
2-nitrophenol	50	39	78
phenol	100	30	30
2,4-dimethylphenol	30	15	50
2,4-dichlorophenal	50	35	70
2,4,6-trichlorophenol	25	21	84
4-chloro-3-methylphenol	75	57	76
2-methyl-4,6-dinitrophenol	250	200	80
pentachlorophenol	75	50	67
4-nitrophenol	50	11	22

These recoveries are acceptable with EPA guidelines.

# RESULTS OF WATER ANALYSIS FOR PHENOL COMPOUNDS BY GC/MS\*

(all results in ug/L)

	E&ELab. No.86-	4983				
Compound	Sample Identity	9006				
phenol		<10				
2-chlorophenol	Ī	<10			Ì	<b>l</b>
2-nitrophenol		<10				ĺ
2,4-dimethylphenol	İ	<10		1		
2,4-dichlorophenol	Ì	<10		<b>j</b>		į
4-chloro-3-methylphenol		<10		<b>i</b>		1
2,4,6-trichlorophenol		<10			_	Ì
2,4-dinitrophenol		<30				ł
4-nitrophenol		<10		}		1
4,6-dinitro-2-methylpheno	1	<30				}
pentachlorophenol	j	<30	}			1

<sup>\*</sup>Samples analyzed by GC/MS instead of by GC.



### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Relative Percent Difference (RPD)
Solids, %	4981	70	70	

### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

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# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED WATER SAMPLES

	E & č	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86-		Percent Recovery		
Lead	4982	0.010	0.025	0.036	104
		:			
	1				
	,				
			:		



# QUALITY CONTROL FOR ACCURACY: PERCENT DIFFERENCE--EPA QUALITY ASSURANCE MATERIALS

	Concentra	Concentrations in ug/L				
Parameter	Known	Determined	Percent Difference			
Oil and Grease	30,000	26,200	12.7			
Cadmium	940	983	4.6			
Chromium	1030	986	4.1			
Copper	1030	1018	1.2			
Lead	53.0	52.6	0.8			
Nickel	1020	988	3.1			
Zinc	1010	1017	0.1			
		ł				
		l				

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E&E Lab. No. 86-	Blank	Blank	4974A*	4975*	4976
Compound	Sample Identity	7/1/86	7/1/86	9001	9002	9003
chlorabenzene		<250	<250	<2500	<2500	<250
1,2-dichlarobenzene		<500	<500	<5000	<5000	<500
1,3-dichlorobenzene		<500	<500	<5000	<5000	<500
1,4-dichlorobenzene		<500	<500	<5000	<5000	<500
benzene		<250	<250	<2500	<2500	<250
total xylenes		<500	<500	26,000	24,000	<500
toluene		<250	<250	<2500	<2500	<250
ethylbenzene		<250	<250	<2500	<2500	<250

<sup>\*</sup>Sample confirmed--results positive.

# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC (Cont.)

(all results in ug/kg as received)

E & E Lab. No. 86-		49 77	49 78	4979	49 80	49 81
Compound	Sample Identity	9004	9025	9026	9047	9048
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlarobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<b>്</b> 00
- benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<b>്00</b>
toluene	•	<250	<250	<250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250

# RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg as received)

U-3615.26

	E&ELab. No.86	Blank	4974 A*	4975*	4976	4977	4978
Compound	Sample Identity	7/7/86	9001	9002	9003	<del>9</del> 004	9025
carbon tetrachloride		<250	<250	<250	<250	<250	<250
1 2-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,1-trichloroethane	.	<250	1,200	2000	<250	<250	<250
1,1-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,2-trichloroethane	·	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloroet	hane	<250	<250	<250	<250	<250	<250
chloroethane	ĺ	<500	<500	<500	<500	<500	<500
2-chloroethylvinyl et	her	<5000	<5000	<5000	<5000	<5000	<5000
chloroform		<250	<250	<250	<250	<250	<250
1,1-dichloroethene	Ì	<100	<100	<100	<100	<100	<100
trans-1,2-dichloroeth	ene	<100	<100	<100	<100	<100	<100
1,2-dichloropropane		<1000	<1000	<1000	<1000	<1000	<1000
trans-1,3-dichloropro	pene	<1000	<1000	<1000	<1000	<1000	<1000
cis-1,3-dichloroprope	ne	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride		64	<50	<50	<50	<50	<50
chloromethane		<500	<500	<500	<500	<500	<500
bromomethane		<500	<500	<500	<500	<500	<500
bromoform		<1000	<1000	<1000	<1000	<1000	<1000
bromodichloromethane		<250	<250	<250	<250	<250	<250
fluorotrichloromethan	ne	<500	<500	<500	<500	<500	<500
dichlorodifluorometha	ine .	<500	<500	<500	<500	<500	<500
chlorodibromomethane		<250	<250	<250	<250	<250	<250
tetrachloroethene		<250	2300	10,000	<250	<250	<250
trichloroethene	ľ	<250	1200	510	<250	<250	<250
vinyl chloride		<500	<500	<500	<500	<500	<500

<sup>\*</sup> Sample confirmed--results positive.

NOTE: Due to low level artifacts present in the methanol used for standard preparation and sample extraction, all sample results have been corrected by subtracting the amount found in the blank. Actual amounts found in the blanks are reported.

# RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (Cont.)

(all results in ug/kg as received)

U-3615.27

	E&ELab. No.86-	49``9	4980	4981		
Compo und	Sample Identity	9026	9047	9048		
carbon tetrachloride		<250	<250	<250		
1,2-dichloroethane	1	<100	<100	<100		
1,1,1-trichloroethane	į	<250	<250	<250	Ì	1
1,1-dichloroethane	Ì	<100	<100	<100	·	l
1,1,2-trichloroethane	j	<500	<500	<500		ł
1,1,2,2-tetrachloroet	hane	<250	<250	<250		
chloroethane	-	<500	<500	<500		1
2-chloroethylvinyl et	her	<5000	<5000	<5000		1
chloroform	j	<250	<250	<250	j	ì
1,1-dichloroethene	1	<100	<100	<100	]	ì
trans-1,2-dichloroeth	ene	<100	<100	<100	Ì	ì
1,2-dichloropropane	i	<1000	<1000	<1000	Ì	<u> </u>
trans-1,3-dichloropro	pene	<1000	<1000	<1000	]	i
cis-1,3-dichloroprope	ne	<1000	<1000	<1000	į	
methylene chloride		<50	<50	<50	İ	
chloromethane	•	<500	<500	<500	1	
bromomethane	)	<500	<500	<500	ł	
bromoform	1	<1000	<1000	<1000	1	Ì
bromodichloromethane		<250	<250	<250	1	
fluorotrichloromethan	e	<500	<500	<500	]	1
dichlorodifluorometha	ne	<500	<500	<500	)	1
chlorodibromomethane	]	<250	<250	<250		
tetrachloroethene		<250	<250	<250	1	1
trichloroethene		<250	<250	<250	1	
vinyl chloride		<500	<500	<500		

NOTE: Due to low level artifacts present in the methanol used for internal standard preparation and sample extraction, all samples have been blank subtracted. The actual value of the blank has been reported.



# RESULTS OF WATER ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS (all results in ug/L)

U-3615.28

	E&ELab. No.86-	49 82 *	49 83*	Blank			
Compound	Sample Identity	9005	9006	7/3/86			
carbon tetrachloride		<0.12	<0.12	<0.12			
1,2-dichloroethane		<0.03	<0.03	<0.03			j
1,1,1-trichloroethane		0.89	0.57	<0.03			1
1,1-dichloroethane		<0.07	<0.07	<0.07			
1,1,2-trichloroethane		<0.02	<0.02	<0.02			
1,1,2,2-tetrachloroet	han <del>e</del>	<0.03	<0.03	<0.03			Ì
chloroethane		<0.52	<0.52	<0.52			
2-chloroethylvinyl et	her '	<0.13	<0.13	<0.13			•
chloroform		<0.05	<0.05	0.08			į
1,1-dichloroethene		<0.13	<0.13	<0.13			
trams-1,2-dichloroeth	ene	<0.10	<0.10	<0.10			}
1,2-dichloropropane		<0.04	<0.04	<0.04			
trans-1,3-dichloropro		<0.34	<0.34	<0.34			•
cis-1,3-dichloroprope	ne	<0.20	<0.20	<0.20			<b>.</b>
methylene chloride		32.2	24.8	2.36			,
chloromethane		<0.08	<0.08	<0.08			]
bromomethane		<1.18	<1.18	<1.18′			)
bromoform		<0.20	<0.20	<0.20			
promodichloromethane		<0.10	<0.10	<0.10			1
fluorotrichloromethan		<2.0	<2.0	<2.0			]
dichlorodifluorometha	ne	<1.81	<1.81	<1.81			
chlorodibromomethane		<0.09	<0.09	<0.09			
tetrachloroethene		14.6	8.1	<0.03			
trichloroethene		0.59	0.51	<0.12			}
vinyl chloride		<0.18	<0.18	<0.18		!	

Sample confirmed--results positive.

TNOTE: Due to low level artifacts present in the methanol used for standard preparation and sample extraction, all sample results have been corrected by subtracting the amount found in the blank. Actual amounts found in the blanks are reported.

# RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/L)

	E & E Lab. No. 86-	4982	4983	Blank	
Compound	Sample Identity	9005	9006	6/30/86	
chlorobenzene		· <0.20	<0.20	<0.20	
1,2-dichlorobenzene		<0.40	<0.40	<0.40	
1,3-dichlorobenzene		<0.40	<0.40	<0.40	
1,4-dichlorobenzene		<0.30	<0.30	<0.30	
benzene		<0.20	<0.20	<0.20	
total xylenes		<1.0	<1.0	<1.0	
toluene		<0.20	<0.20	<0.20	
ethy lbenzene		<0.20	<0.20	<0.20	



# RESULTS OF WATER ANALYSES FOR PESTICIDES/PCB AND HERBICIDES

(all results in ug/L)

	E & E Lab. No. 86-	4982	4983	81ank				
Campound	Sample Identity	9005	9006					
Aldrin		<0.05	<0.05	<0.05				
a-BHC		<0.45	<ü.05	<0.05	}	i	ł	1
b-BHC		<0.₺	<0.05	<0.05		ì	i	Ì
g-8HC		<0.05	<0.05	<0.05	ļ			
d-BHC		<0.05	<0.05	<0.05	1	ĺ	ĺ	İ
Chlordane	•	<0.50	<0.50	<0.50	1			
4,4'-000		<0.10	<0.10	<0.10	1		}	
4,4'-DOE		<0.10	<0.10	<0.10	1	Ì	ŀ	
4,4'-DDT		<0.10	<0.10	<0.10		ł	1	Ì
Dieldrin		<0.10	<0.10	<0.10				
Endosulfan I		<0.05	<0.05	<0.05	•	Ì		}
Endosulfan II		<0.10	<0.10	<0.10		1	ļ	}
Endosulfan sulfate		<0.10	<0.10	<0.10	1	}	į.	ĺ
Endrin		<0.10	<0.10	<0.10				ĺ
Endrin aldehyde		<0.10	<0.10	<0.10		ļ		
Heptachlor		<0.05	<0.05	<0.05				i
Heptachlor epoxide		<0.05	<0.05	<0.05	1	1		
PCB - 1016		<0.50	<0.50	<0.50	1			
PCB - 1221		<0.50	<0.50	<0.50				
PCB - 1232		<0.50	<0.50	<0.50			Ì	
PCB - 1242	i	<0.50	<0.50	<0.50				
PCB - 1248		<0.50	<0.50	<0.50	1			
PCB - 1254		<1.0	<1.0	<1.0	1		{	
PCB - 1260		<1.0	<1.0	<1.0	1	l	Í	
2,4-D		<0.5	<0.5	<0.5	1	]	1	1
2,4,5-T		<0.05	<0.05	<0.05	į.			
2,4,5-TP (Silvex)		<0.05	<0.05	<0.05	1			ĺ
Toxaphene		<1.0	<1.0	<1.0	1		1	



# RESULTS OF SOIL ANALYSES FOR PESTICIDES/PCB AND HERBICIDES

(mg/kg as received)

U-3615.31

	E&ELab. No.86-	4974A	4975	4976	4977	4978	4979*	Blank
Compound	Sample Identity	9001	9002	9003	9004	9025	9026	
Aldrin		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
a-BHC		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
b-8HC		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
g-8HC		<1.8	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
d-BHC		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlordane		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4,4'-DDD		<1.0	<1.0	<1.0	<1.0	<1.0	1.7	<1.0
4,4'-DDE		<1.0	<1.0	<1.8	<1.0	<1.0	<1.0	<1.0
4,4'-DDT		<1.0	<1.0	<1.0	<1.0	<1.0	1.3	<1.0
Dieldrin		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Endosulfan I		<1.0	<1.B	<1.8	<1.0	۵.۱>	<1.0	<1.0
Endosulfan II	!	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Endosulfan sulfate		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Endrin		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Heptachlor		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1016		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1221		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PC8 - 1232		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1242		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1248		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1254		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1260		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-D		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,5-T		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5
2,4,5-TP (Silvex)		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.05
Toxaphene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.05

<sup>\*</sup>Sample confirmed-results positive.



## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

## RESULTS OF WATER ANALYSIS FOR ORGANOPHOSPHOROUS PESTICIDES BY GC

(all results in ug/L)

	E & E Lab. No. 86-	4982	49 83	81ank			
Compound	Sample Identity	9005	9006	7/1/86			
Naled		<0.10	<0.10	<0.10			
Phorate		<0.15	<0.15	<0.15		1	
Disulfoton		<0.20	<0.20	<0.20			
Chlorpyrifos		<0.30	<0.30	<0.30			
Dimethoate		<0.30	<0.30	<0.30			
Malathion		<0.30	<0.30	<0.30			•
Mevinphos		<0.30	<0.30	<0.30	<u> </u>		ĺ
Parathion		<0.30	<0.30	<0.30			
Methyl parathion		<0.30	<0.30	<0.30	}		
Diazinon		<0.60	<0.60	<0.60			
Methyl azinphos		<1.5	<1.5	<1.5	<u> </u> 		



## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

## RESULTS OF SOIL ANALYSIS FOR ORGANOPHOSPHOROUS PESTICIDES BY GC

(all results in mg/kg as received)

		E&E Lab. No. 86-	4974A	4975	4976	4977	4978	4979	Blank
	Compound	Sample Identity	9001	9002	9003	9004	9025	90 26	7/1/86
	Naled		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ł	Phorate		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ì	Disulfaton		<1.0	<1.0	<1.0	<1.0	· <1.0	<1.0	<1.0
l	Chlorpyrifos		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
١	Dimethoate		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1	Malathion		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
١	Mevinphos		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1	Parathion		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Methyl parathion		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Diazinon		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Methyl azinphos		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0





## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED WATER SAMPLES

	E&E	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86-		(ug/L)		Percent Recovery
1,2-Dichlorobenzene	4983	<0.40	10.0	9.4	94
1,3-Dichlorobenzene	4983	<0.40	10.0	9.3	93
1,4-Dichlorobenzene	4983	<0.30	10.0	9.4	94
benzene	4983	<0.20	10.0	10.9	109
toluene	4983	<0.20	10.0	9.2	92
ethyl benzene	4983	<0.20	10.0	9.0	90

# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E & E	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86-		Percent Recovery		
1,2-Dichlorobenzene	4981	<500	5000	4610	92.2
1,3-Dichlorobenzene	4981	<500	5000	3815	76.3
1,4-Dichlorobenzene	4981	<500	5000	4285	85.7
benzene	4981	<250	5000	2745	54.9
toluene	4981	<250	5000	5600	112
ethyl benzene	4981	<250	5000	4205	84.1

# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E & E	Original Value	Amount Added	Amount Determined		
Parameter	Laboratory No. 86-	Laboratory No. 86- (ug/kg)			Percent Recovery	
carbon tetrachloride	4981	<250	1250	863.8	69.1	
1,2-dichloroethane	49 81	<100	1250	820.0	65.6	
1,1,1-trichloroethane	4981	<250	1250	875.0	70.0	
1,1-dichloroethane	4981	<100	1250	961 .3	76.9	
chloroethane	4981	<500	1250	1245	99.6	
chloroform	49 81	<250	1250	922.5	73.8	
trans-1,2-dichloroethene	4981	<100	1250	777.5	62.2	
methylene chloride	4981	<50	1250	658.8	52.7	
chloromethane	49 81	<500	1250	1112	89.0	
bromomethane	4981	<500	1250	956.2	76.5	
bromoform	4981	<1000	1250	1098	87.8	
bromodichloromethane	4981	<250	1250	675.0	54.0	
trichloroethene	4981	<250	1250	1219	97.5	

## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED WATER SAMPLES

	E&E				
Parameter	Laboratory No. 86-	No. 86- (ug/L)			Percent Recovery
carbon tetrachloride	4983	<0.12	10.0	8.70	87.0
1,2-dichloroethane	4983	<0.03	10.0	8.46	84.6
1,1,1-trichloroethane	4983	0.57	10.0	10.2	96.2
1,1-dichloraethane	4983	<0.07	10.0	8.64	86.4
chloroethane	4983	<0.52	10.0	10.0	100
chloroform	4983	<0.05	10.0	8.57	85.7
trans-1,2-dichloroethene	4983	<0.10	10.0	10.0	100
methylene chloride	4983	24.8	10.0	39.1	143
chloroemthane	4983	<0.08	10.0	10.0	100
bromomethane	4983	<1.81	10.0	8.46	84.6
bromaform	4983	<0.20	10.0	8.89	88.9
bromodichloromethane	4983	<0.10	10.0	9.42	94.2
trichloroethene	4983	0.51	10.0	10.3	97.9

# QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

			ıg/L	Relative
Compound	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Aldrin	49 82	<0.05	<0.05	
a-BHC	4982	<0.05	<0.05	
b-BHC	4982	<0.05	<0.05	
g-BHC	4982	<0.05	<0.05	
d-BHC	49 82	<0.05	<0.05	
Chlordane	4982	<0.50	<0.50	
4,4'-DDD	4982	<0.10	<0.10	
4,4'-DDE	4982	<0.10	<0.10	
4,4'-DDT	49 82	<0.10	<0.10	
Dieldrin	4982	<0.10	<0.10	
Endosulfan I	4982	<0.05	<0.05	
Endosulfan II	49 82	<0.10	<0.10	
Endosulfan sulfate	4982	<0.10	<0.10	
Endrin	4982	<0.10	<0.10	}
Endrin aldehyde	49 82	<0.10	<0.10	
Heptachlor	49 82	<0.05	<0.05	
Heptachlor epoxide	49 82	<0.05	<0.05	
PCB - 1016	4982	<0.50	<0.50	
PCB - 1221	4982	<0.50	<0.50	
PCB - 1232	49 82	<0.50	<0.50	
PCB - 1242	4982	<0.50	<0.50	}
PCB - 1248	49 82	<0.50	<0.50	
PCB - 1254	4982	<1.0	<1.0	
PCB - 1260	4982	<1.0	<1.0	
Toxaphene	49 82	<1.0	<1.0	



# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED WATER SAMPLES

	£ & É	Original Value	Assount Added	Amount Determined	
Parameter	Laboratory No. 86-		(ug/L)		Percent Recovery
2,4-D	49 82	<0.5	100	76	76
Silvex	4982	<0.05	100	79	79

# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86-	(mg	/kg as received)		Percent Recovery
2,4-D	4977	<1.0	4.0	2.8	70
Silvex	4977	<1.0	4.0	2.1	53

## QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

		(u	g/L)	Relative
Parameter	E&E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Naled	4982	<0.10	<0.10	
Phorate	49 82	<0.15	<0.15	
Di sul foton	49 82	<0.20	<0.20	
Chlorpyrifos	4982	<0.30	<0.30	
Dimethoate	4982	<0.30	<0.30	
Malathion	4982	<0.30	<0.30	
Mevinphos	49 82	<0.30	<0.30	
Parathion	49 82	<0.30	<0.30	
Parathion Methyl	49 82	<0.30	<0.30	
Diazinon	4982	<0.60	<0.60	
Azinphos Methyl	4982	<1.5	<1.5	
	<u> </u>			

# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

## RESULTS OF WATER ANALYSIS FOR PHENOLS BY GC

(all results in ug/L)

U-3801.2

	E & E Lab. No. 86-	5911	81 ank		
Compound	Sample Identity	9005	7/31/86		
phenol		4.8	<0.14		
2-chlorophenol		<10*	<0.31	ļ	j
2-nitrophenol	ļ	<10*	<0.45		}
2,4-dimethylphenol		<10*	<0.32		ļ
2,4-dichlorophenol		<10*	<0.39	ļ	
4-chloro-3-methylphenol		<10*	<0.36	j	
2,4,6-trichlorophenol		<10*	<0.64	}	ł
2,4-dinitrophenol		<13	<13		
4-nitrophenol		<10*	<2.8	(	
4,6-dinitro-2-methylphenol		<16	<16		
pentachlorophenol	Í	<10*	<7.4		

<sup>\*</sup>Elevated detection limits due to matrix interferences.

ASSOCIATION OF STREET, SECRETARIES ASSOCIATION OF SECRETARIES ASSOCIATION OF SECRETARIA PROPERTY.



# QUALITY CONTROL FOR SPIKED SAMPLES OF WATER ANALYSIS

U-3801.1

		u			
Compound	E & E Lab. No. 86- DI Spike	Original Analysis	Spike Amount	Amount Determined	% Recovery
phenol		<0.14	40	16	40
2-chlorophenol		<0.31	40	16	40
2-nitrophenol		<0.45	40	27	68
2,4-dimethylphenol	i	<0.32	40	26	65
2,4-dichlorophenol		<0.39	40	27	68
4-chloro-3-methylphenol		<0.36	40	28	70
2,4,6-trichlorophenol		<0.64	40	29	73
4-nitrophenol		<2.8	40	7.4	19
4,6-dinitro-2-methylphenol		<16	40	24	60
			, 		

## PLE IDENTIFICATION



## SAMPLE IDENTIFICATION CROSS-REFERENCE

Laboratory Number 86-	Field Number	Field Location
5940	9012	0165-S0-001-GS-86-9012
5941	9013	0165-S0-001-GS-86-9013
5942	9014	0165-S0-001-GS-86-9014
5943	9141	0165-S0-001-GS-86-9141
5944	9160	0165-S0-001-GS-36-9160
5945	9161	0165-S0-001-GS-86-9161
5946	9162	0165-S0-001-GS-86-9162
5947	9163	0165-S0-001-GS-86-9163



# SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3809

		<u> </u>
	Pet. HC(28)	
	Pet.	
	0&G(28)	8/1
	98	8/27 8/27 8/27 8/27
	TDS (7)	1
	SOL	
	yeis	8 / 8 8 / 4 8 / 4 7 / 8 8 / 4
(0† +	Analysis	6/6
BNA(14/E + 40)	tion	15/7
	Extraction	8 413 8 413 8 413
	7818 8001	
5 + 30)	Analysis	
PAH (7/S + 30)	ction	1111
	Extraction	
	Semple	7/30
	Sample	5940 5941 5943 5943
	Jop	3809

DEAD: EXTR: ANAL: ( ): S+#:

Date sample holding time expires.

Date sample was extracted.

Date sample was analyzed.

Holding time.

Holding time expiration based on sample date.

Holding time expiration based on extraction date.

U-3809.1

	ysis	Anal	1111
/E+30)	Analysis	Dead	1111
Pheno18(7/E+30)	Extraction	Extr	1111
튑	Extra	Dead	1111
	Analysis	Anal	8 8 8 8 8 9 8 9 9 9 9 9 9 9 9 9 9 9 9 9
Organophos(7/S+14)	Anal	Dead	8/13 8/13 8/13
anophoe	Extraction	Extr	1,8/7
55	Extra	Dead	8888 9
	Analysis	Anal	88 67 7 7 8 8
Pest/PCB(7/E+40)	Ana	Dead	6666
st/PCB(	Extraction	Extr	15/7
الم	Extra	Dead	8 8 8 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
	Analysis	Anal	8 8 8 8
Herb(7/E+30)	Ana	Dead	4444
Herb(7	Extraction	Extr	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
	Extra	Dead	8888
	5	Anal	8 8 8 8 2 5 5 5
		Dead	8 8 8 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1
	Semple	Date	7/30 7/30 7/30 7/30
	Sample	Number	5940 5941 5943 5943
	Зор		H-58

Date sample holding time expires. Date sample was extracted. Date sample was analyzed.

EXTR: EXTR: ANAL:

Holding time expires. Holding time based on sample date. Holding time based on sample extraction.







## LABORATORY REPORT

FOR

#### REESE AIR FORCE BASE

U-3809.3

Job No.:	U-3809		RE:	DF-20	000		
Sample Date:	7/30/86		P.O. No.:				
Date Received:	7/31/86		Sampled By: E & E, Inc.				
Sample Type:	Soil		Delivered	By: Feder	al Express		
E & E Lab. No. 86-	5940	5941	5942	5943			
Customer No.	9012	9013	9014	9141			
Sample Identity							
	Results i	n: mg/kg u	unless noted				
Oil and Grease	200	<100	<100	<100			
Solids, %	83	75	91	81			

## Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA 1982.

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Supervising Analyst:

Date:





## ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

## RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

rananaranananananana						
	ECOLOGY NALYTIC/	. THIS CHILL		C. CENTE		
	RESULTS OF SOIL	. ANALYSIS F	OR PRIORITY	POLLUTANT		
		E AROMATIC Bults in ug/				
	(412 100	50103 III ug/	ng as recer	<b>V</b> EQ)		
	<del>,</del>	<del></del>				U-3809
	E & E Lab. No. 86-	Blank	5940	5941	5942	5943
Compound	Sample Identity	8/5/86	9012	9013	9014	9141
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<50 <b>0</b>	<500
toluene		<250	<250	<250	<250	<250
ethylbenzen <b>e</b>		<250	<250	<250	<250	<250



## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

## RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANTS BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

Compound bis(2-chloroethyl)ether 1,3-dichlorobenzene 1,4-dichlorobenzene 1,2-dichlorobenzene bis(2-chloroisopropyl)ether	Sample Identity	9012	9013	9014		
1,3-dichlorobenzene 1,4-dichlorobenzene 1,2-dichlorobenzene bis(2-chloroisopropyl)ether				2014	9141	ug/L
1,4-dichlorobenzene 1,2-dichlorobenzene bis(2-chloroisopropyl)ether		<1	<1	<1	<1	<10
1,4-dichlorobenzene 1,2-dichlorobenzene bis(2-chloroisopropyl)ether		<b>&lt;</b> 1	<1	<1	<1	<10
bis(2-chloroisopropyl)ether		<1	<1	<1	<1	<10
bis(2-chloroisopropyl)ether		<1	<1	<1	<1	<10
		<1	<1	<1	<1	<10
N-nitrosodipropylamine		<1	<1	<1	(1	<10
hexachloroethane		<1	<1	<1	\ \cdot \( \cdot \) \ \ \( \cdot \) \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	<10
nitrobenzene		<1	<1	<1	3	<10
isaphorane		<b>&lt;</b> 1	ζ1	<1	31	<10 <10
bis(2-chloroethoxy)methane		31	\ \cdot\(\frac{1}{2}\)	<1	<1	<10
1,2,4-trichlorobenzene		<b>&lt;</b> 1	<b>1</b>	<1	(1	<10
naphthalene		<1	\ \cdot\(\frac{1}{3}\)	<1	3	<10
hexachlorobutadiene		<b>\(\cdot\)</b>	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	<1	(1)	
hexachlorocyclopentadiene		<b>\(\)</b>	<1	<1	<1	<10
2-chloronaphthalene		<b>&lt;1</b>	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			<10
dimethyl phthalate		<b>(1</b>	<b>(1</b>	<1	<1	<10
				<b>&lt;1</b>	<1	<10
acenaphthylene	į.	<1	<1	<1	<1	<10
fluorene		<1	<1	<1	<1	<10
acenaphthene		<1	<1	<b>&lt;1</b>	<1	<10
2,4-dinitrotoluene		<1	<1	<b>&lt;</b> 1	<1	<10
2,6-dinitrotoluene		<b>&lt;1</b>	<b>&lt;1</b>	<b>&lt;1</b>	<1	<10
diethylphthalate		<b>&lt;1</b>	<b>&lt;</b> 1	<1	<1	<10
4-chlorophenyl phenyl ether		<1	<1	<1	<1	<10
N-nitrosodiphenylamine		<1	<1	<1	<1	<10
4-bromophenyl phenyl ether		<1	<1	<1	<1	<10
hexachlorobenzene		<1	<1	<1	<1	<10
phenanthrene		<1	<1	<1	<1	<10
anthracene		<1	<1	<1	<1	<10
di-n-butyl phthalate		<1	<1	<1	<1	<10
fluoranthene		<1	<1	<1	<1	<10
benzidi <b>ne</b>		<5	<5	<5	<5	<50
pyrene		<1	<1	<1	<1	<10
butyl benzyl phthalate		<1	<1	<1	<1	<10
3,3'-dichlorobenzidine		<3	<3	<3	<3	<30
benzo(a)anthracene		<1	<1	<1	<1	<10
bis(2-ethylhexyl)phthalate		<1*	<1*	<1	<1	<10
chrysene		<1	<1	<1	<1	<10
di-n-octyl phthalate		2.3	<1*	<1#	<1*	<10
benzo(b) fluoranthene		<1	<1	<1	<1	<10
benzo(k) fluoranthene		<1	<1	<b>&lt;1</b>	<u>₹1</u>	<10
benzo(a)pyrene		<1	<1	<1	<1	<10
indeno(1,2,3-cd)pyrene		<1	<u> </u>	\ \{1	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	<10
dibenzo(a,h)anthracene		<1 <1	<1 <1	<b>&lt;</b> 1	\ \langle 1	<10
benzo(ghi)perylene		<1 <1	<1 <1	<1	\ \langle 1	<10 <10

<sup>\*</sup>Compound present below measurable detection limit.

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

# RESULTS OF SOIL ANALYSIS FOR ORGANOPHOSPHOROUS PESTICIDES BY GC

(all results in ug/g as received)

	E & E Lab. No. 86-	Blank	5940	5941	5942	5943	
Compound	Sample Identity	7/31/86	9012	9013	9014	9141	
Naled		<1.0	<1.0	<1.0	<1.0	<1.0	
Phorate		<1.0	<1.0	<1.0	<1.0	<1.0	
Disulfoton		<1.0	<1.0	<1.0	<1.0	<1.0	
Chlorpyrifos		<1.0	<1.0	<1.0	<1.0	<1.0	
Dimethoate		<1.0	<1.0	<1.0	<1.0	<1.0	
Malathion	Į.	<1.0	<1.0	<1.0	<1.0	<1.0	İ
Mevinphos		<1.0	<1.0	<1.0	<1.0	<1.0	
Parathion		<1.0	<1.0	<1.0	<1.0	<1.0	
Methyl parathion		<1.0	<1.0	<1.0	<1.0	<1.0	
Diazinon	Į	<1.0	<1.0	<1.0	<1.0	<1.0	
Methyl azinphos		<1.0	<1.0	<1.0	<1.0	<1.0	1

## QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

		(ug/	Relative	
Parameter 	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Naled	5942	<1.0	<1.0	
Phorate	5942	<1.0	<1.0	
Disulfoton	5942	<1.0	<1.0	
Chlorpyrifos	5942	<1.0	<1.0	
Dimethoate	5942	<1.0	<1.0	
Malathion	5942	<1.0	<1.0	
Mevinphos	5942	<1.0	<1.0	
Perathion	5942	<1.0	<1.0	
Methyl perathion	5942	<1.0	<1.0	
Diazinon	5942	<1.0	<1.0	
Methyl azinphos	5942	<1.0	<1.0	

# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

# RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALDCARBON COMPOUNDS BY GC (all results in ug/kg as received)

	E&ELab. No. 86-	Blank	5940	5941	5942	5943	
Compound	Sample Identity	8/5/86	9012	9013	9014	9141	
carbon tetrachloride		<250	<250	<250	<250	<250	
1,2-dichloroethane		<100	<100	<100	<100	<100	
1,1,1-trichloroethan	e !	<250	<250	<250	<250	<250	
1,1-dichloroethane		<100	<100	<100	<100	<100	
1,1,2-trichloroethan	•	<500	<500	<500	<500	<500	
1,1,2,2-tetrachloroe	thane	<250	<250	<250	<250	<250	
chloroethane		<500	<500	<500	<500	<500	
2-chloroethylvinyl e	ther	<5000	<5000	<5000	<5000	<5000	
chloroform		<250	<250	<250	<250	<250	
1,1-dichloroethene		<100	<100	<100	<100	<100	
trans-1,2-dichloroet	hene	<100	<100	<100	<100	<100	
1,2-dichloropropane		<1000	<1000	<1000	<1000	<1000	
trens-1,3-dichloropr	opene	<1000	<1000	<1000	<1000	<1000	
cis-1,3-dichloroprop	ene	<1000	<1000	<1000	<1000	<1000	
methylene chloride	)	<50	<50	<50	<50	<50	
chloromethane	Ì	<500	<500	<500	<500	<500	
brumomethan <b>e</b>		<500	<500	<500	<500	<500	
bromoform		<1000	<1000	<1000	<1000	<1000	l
bromodiciloromethane		<250	<250	<250	<250	<250	
fluorotrichlorometha	ne	<50 <b>0</b>	<500	<500	<500	<500	
dichlorodifluorometh	ane	<500	<500	<500	<50 <b>0</b>	<500	
chlorodibromomethane		<250	<250	<250	<25 <b>0</b>	<250	ı
tetrachloroethene		<250	<250	<250	<250	<250	
trichloroethene		<250	<250	<250	<250	<250	
vinyl chloride		<50 <b>0</b>	<500	<500	<500	<500	



# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SAMPLES

	E & E	Original Value	Amount Added	Amount Determined	
Compound	Laboratory No. 86-		Percent Recovery		
1,2,4-Trichlorobenzene	5942	<1	3.3	2.9	87.9
Acenaphthene	5942	<1	3.3	3.0	90.9
2,4 Dinitrotoluene	5942	<1	3.3	2.6	78.8
Pyrene	5942	<1	3.3	3.0	90.9
N-Nitrosodi-n-Propylamine	5942	<1	3.3	2.9	87.9
1,4-Dichlorobenzene	5942	<1	3.3	2.8	84.8
Pentachlorophenol	5942	<3	6.6	5.0	75.8
Phenol	5942	<1	6.6	3.5	53.0
2-Chlorophenol	5942	<1	6.6	5.0	75.8
4-Chloro-3-Methylphenol	5942	<1	6.6	5.7	86.4
4-Nitrophenol	5942	<1	6.6	3.4	51.5
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## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PESTICIDES/PCB'S AND HERBICIDES BY GC

(all results in mg/kg as received)

	E & E Lab. No. 86-	Blank	5940	5941	5942	5943	
Compound	Sample Identity	7/31/86	9012	9013	9014	9141	
Aldrin		<1.0	<1.0	<1.0	<1.0	<1.0	
a-BHC		<1.0	<1.0	<1.0	<1.0	<1.0	1
b-BHC		<1.0	<1.0	<1.0	<1.0	<1.0	1
g-BHC		<1.0	<1.0	<1.0	<1.0	<1.0	
d-BHC		<1.0	<1.0	<1.0	<1.0	<1.0	
Chlordane		<1.0	<1.0	<1.0	<1.0	<1.0	
4,4'-DOD		<1.0	<1.0	<1.0	<1.0	<1.0	i
4,4'-DOE		<1.0	<1.0	<1.0	<1.0	<1.0	
4,4'-DDT		<1.0	<1.0	<1.0	<1.0	<1.0	
Dieldrin	•	<1.0	<1.0	<1.0	<1.0	<1.0	
Endosulfan I		<1.0	<1.0	<1.0	<1.0	<1.0	ĺ
Endosulfan II		<1.0	<1.0	<1.0	<1.0	<1.0	
Endosulfan sulfate		<1.0	<1.0	<1.0	<1.0	<1.0	
Endrin		<1.0	<1.0	<1.0	<1.0	<1.0	
Endrin aldehyde		<1.0	<1.0	<1.0	<1.0	<1.0	
Heptachlor		<1.0	<1.0	<1.0	<1.0	<1.0	
Heptachlor epoxide		<1.0	<1.0	<1.0	<1.0	<1.0	
PCB - 1016		<1.0	<1.0	<1.0	<1.0	<1.0	
PCB - 1221		<1.0	<1.0	<1.0	<1.0	<1.0	
PCB - 1232		<1.0	<1.0	<1.0	<1.0	<1.0	
PCB - 1242		<1.0	<1.0	<1.0	<1.0	<1.0	
PCB - 1248		<1.0	<1.0	<1.0	<1.0	<1.0	
PCB - 1254		<1.0	<1.0	<1.0	<1.0	<1.0	
PCB - 1260		<1.0	<1.0	<1.0	<1.0	<1.0	
Toxaphene		<1.0	<1.0	<1.0	<1.0	<1.0	
2,4-D	,	<1.0	<1.0	<1.0	<1.0	<1.0	
2,4,5-TP (Silvex)		<1.0	<1.0	<1.0	<1.0	<1.0	
2,4,5-T		<1.0	<1.0	<1.0	<1.0	<1.0	

## QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

		(mg/	kg)	Relative
Parameter 	E & E Laboratory No. 86-	Original Analyais	Replicate Analysis	Percent Difference (RPD)
Aldrin	5942	<1.0	<1.0	
a-BHc	5942	<1.0	<1.0	
b-8HC	5942	<1.0	<1.0	
g-BHC	5942	<1.0	<1.0	
d-BHC	5942	<1.0	<1.0	
Chlordane	5942	<1.0	<1.0	
4,4'-DDD	5942	<1.0	<1.0	
4,4'-DDE	5942	<1.0	<1.0	
4,4'-DDT	5942	<1.0	<1.0	
Dieldrin	5942	<1.0	<1.0	
Endosulfan I	5942	<1.0	<1.0	
Endosulfan II	5942	<1.0	<1.0	<b></b>
Endosulfan sulfate	5942	<1.0	<1.0	
Endrin	5942	<1.0	<1.0	
Endrin aldehyde	5942	<1.0	<1.0	
Heptachlor	5942	<1.0	<1.0	
Heptachlor epoxide	5942	<1.0	<1.0	
PCB - 1016	5942	<1.0	<1.0	
PCB - 1221	5942	<1.0	<1.0	
PCB - 1232	5942	<1.0	<1.0	
PCB - 1242	5942	<1.0	<1.0	
PCB - 1248	59\$2	<1.0	<1.0	
PCB - 1254	5942	<1.0	<1.0	]
PCB - 1260	5942	<1.0	<1.0	
Toxaphene	5942	<1.0	<1.0	



### LABORATORY REPORT

FOR

#### Reese Air Force Base

3809.13

Job No.: U-3809			RE:		DF-200	0	
Sample Date: 7/30/8	6		P.0	. No.:			
Date Received: 7/31/8	6		Sam	pled By:	Ε&Ε,	Inc.	
Sample Type: Soil			Del	ivered By	: Federa	l Express	1
RESULTS OF CHEMICAL	ANALYSIS	OF EXTRA	CTS FROM	EP TOXICI	TY TESTS	& IGNITAE	ILITY
			mg	/L			Maximum Allowable Concen- tration (mg/L)
E & E Lab. No. 86-	5944	5945	5946	5947	Blank		
Customer No.	9160	9161	9162	9163			
Sample Identity							
Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Endrin Lindane Methoxychlor Toxaphene 2,4-D	<0.5 <5.0 <0.1 <0.5 <0.02 <0.5 <0.05 <0.7 NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.02 <0.5 <0.5 NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.02 <0.5 <0.5 NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.02 <0.5 <0.5 NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.02 <0.5 <0.05 NR NR NR NR NR		5.0 100.0 1.0 5.0 .0 0.2 1.0 5.0 0.02 0.4 10.0 0.5
2,4,5-TP (Silvex) Ignitability, *F	NR >140	NR >140	NR >140	NR >140	NR NA		1.0

NA: Not Applicable

NR: Analysis not requested

Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

recycled paper

Supervising Analyst: Au Han //



# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86-		(ug/g)		Percent Recovery
2,4-D	5943	<1.0	4.0	3.8	95
Silvex	5943	<1.0	4.0	3,1	78
				i	



# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	EAF	Original Value	Amount Added	Amount Determined	
Parameter	E & E Laboratory No. 86-		(mg/kg	)	Percent Recovery
Oil and Grease	5942	<100	3980	4460	113
		`			
	-				
			{		

## QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

		(m	g/kg)	Relative
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Solids	5942	91	93	3.3
Flashpoint	5947	>140	>140	
				}
				į

## ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

## RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

ENVIRONMEN SERVI LYSIS FOR P BLE COMPOUN in mg/kg, a 5940 9012	CES CE RIORITY POL DS BY GC/MS s received) 5941 9013	LUTANT	5943 9141	U-386 Blan ug/t
5940 9012	DS BY GC/MS B received) 5941 9013	5942		Lab 81a
5940 9012	5941 9013	5942		Lab 81 a
5940 9012 <1	5941 9013	5942		Lab 81 a
9012	9013			81 a
<1		9014	9141	ug/
1		i		<del> </del>
<1	<1	<1	<1	<10
	<1	<1	<1	<10
<1	<b>&lt;</b> 1	<1	<1	<10
<1	<1	<1	<1	<10
<b>&lt;</b> 1	<1	<1	<1	<10
	<b>&lt;</b> 1	<1	1	<10
1	1	1	1	<10
				<30
	1	1	4	<10
1	1			<30
	<1 <1 <3 <1 <3 <3 <3 imit.	(1 (1 (1 (1 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3	(1)     (1)     (1)       (1)     (1)     (1)       (3)     (3)     (3)       (1)     (1)     (1)       (3)     (3)     (3)       (3)     (3)     (3)	(1)     (1)     (1)     (1)       (1)     (1)     (1)     (1)       (3)     (3)     (3)     (3)       (1)     (1)     (1)     (1)       (3)     (3)     (3)     (3)       (3)     (3)     (3)     (3)

<sup>\*</sup>Compound present below measurable detection limit.

# SAMPLE IDENTIFICATION CROSS-REFERENCE

U-3800

Laboratory Number 86-	Field Number	Field Location
5901	9015	0165-S0-001-GS-86-9015
5902	9016	0165-S0-001-GS-86-9016
5903	9017	0165-S0-001-GS-86-9017
5904	9018	0165-S0-001-GS-86-9018
5905	9019	0165-S0-001-GS-86-9019
5906	9020	0 165-S0-00 1-GS-86-9020
5907	9021	0165-S0-001-GS-86-9021
5908	9022	0165-S0-001-GS-86-9022
5909	9023	0165-S0-001-GS-86-9023
5910	9024	0165-S0-001-GS-86-9024

# SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

garalessyssiss - anaram resessis - aspass - anaros - anar

					<del></del>
0-2000.1		(918	Anal	111111111	
ò	/E+30)	Analysis	Dead	111111111	-
	Phenols(7/E+30)	ction	Extr	111111111	
	ų.	Extraction	Dead	111111111	
	7	Analysis	Anal	888888888	
	(7/5+14	Anal	Dead	88 88 88 88 88 88 88 88 88 88 88 88 88	
	Organophos(7/S+14)	Extraction	Extr	7/30 2/30 2/30 2/30 2/30 2/30 2/30 2/30 2	
	<u> </u>	Extra	Dead	888888888 8888888888888888888888888888	
		Analysis	Anal	222222222	CB 110N
	Pest/PCB(7/E+40)	Anal	Dead	888888888888666666666666666666666666666	PESI/PCB CONFIRMATION DATE 7/31
	st/PCB(	Extraction	Extr	7/30 7/30 7/30 7/30 7/30 7/30 7/30	20065
	21	Extra	Dead	888888888 222222222	
		Analysis	Anal	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	
	Herb(7/E+30)	Anal	Dead	2000000000 2222222222	
	Herb(7	Extraction	Extr	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	
		Extra	Dead	888888888 \$25555555	
		(4)	Anal	88 88 88 88 88 88 88 88 88 88 88 88 88	
		VOA(14)	Dead	8 8 8 7 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
		1 ( Geo 2	Date	7/29 7/29 7/29 7/29 7/29 7/29	
		a Como S	Number	590.1 590.2 590.4 590.4 590.5 590.5 590.8 590.8	
		<u></u>	3	H-74	

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time expires.
Holding time based on sample date.
Holding time based on sample extraction. IX AD: LXIR: ANAL: ( ): S+#: L+#:





Bern manne



# SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3800.2

				PÁH (7/S + 30)	S + 30)			BNA(7/E + 40)	+ 40)	-						
4				Extraction	Anal	Analysis	Extraction	tion	Analysis	ysis	105	105 (7)	0&G(28)	28)	Pet.	Pet. HC(28)
gor	Number	Date	Dead	Extr	Dead	Anal	Dead	Extr	Dead	Anal	Dead	Anal	Dead	Anal	Dead	Anal
U-3800	5901	1/29	ŀ	;	;	;	8/12	1/31	6/6	8/5	i	:	8/26	1/8	i	
	5902	1/29	1	1	;	;	8/12	7/31	6/6	8/25	1	1	8/26	8/1	1	;
	5903	1/29	ŀ		1	1	8/12	7/31	6/6	8/5	i	1	8/26	8/1	1	;
	5904	1/29	1	1	;	;	8/12	1/31	6/6	8/5	1	1	8/26	1/8		1
	5905	1/29	1	!	!	!	8/12	1/31	6/6	8/5	1	;	8/26	8/1	-	!
	9065	1/29	1	!	!	1	8/12	1/31	6/6	8/,2	-	!	8/26	8/1		1
	2907	1/29	1	!	1	1	8/12	7/31	6/6	8/5	-	;	8/26	1/8	;	;
	9065	1/29	1	;	!	1	8/12	1/31	6/6	8/5	!	!	8/26	8/1	;	;
	6065	1/29	1	;	;	1	8/12	1/31	6/6	8/5	1	1	8/56	8/1	1	1
	5910	1/29		;	;		8/12	7/31	6/6	8/5	1	-	8/26	8/1	!	1
				1	1	1	1	†	1	†	1	†	1	1	1	

Date sample holding time expires. DE AD:

Date sample was estracted. EXIR:

Date sample was analyzed. ANAL:

Holding time expires.

Holding time based on sample date. ( ); S+#; E+#;

Holding time based on sample extraction date.



## LABORATORY REPORT

### FOR

#### Reese Air Force Base

U-3800.3

Job No.: U-3800			RE:	DF-20	100	
Sample Date: 7/29/8	6		P.O. No.:			
Date Received: 7/30/8	16		Sampled B	y: E&E	, Inc.	
Sample Type: Soil			Delivered	By: Feder	al Express	
E & E Lab. No. 86-	5901	5902	5903	5904	5905	
Customer No.	9015	9016	9017	9018	9019	
Sample Identity						
	Results i	n: mg/kg* ∪	inless noted			
Oil and Grease Solids, %	470 88	<100 88	<100 92	<100 86	<100 88	

<sup>\*</sup>As received

### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: <u>1</u>

Date:



## LABORATORY REPORT

FOR

#### Reese Air Force Base

U-3800.4

Jab No.: U-3800			RE:	DF -201	00	
Sample Date: 7/29/8	6		P.O. No.:			
Date Received: 7/30/8	6		Sampled B	y: E&E	, Inc.	
Sample Type: Soil			Delivered	By: Feder	al Express	
£ & E Lab. No. 86-	5906	5907	5908	5909	5910	
Customer No.	9020	9021	9022	9023	9024	
Sample Identity						
	Results i	n: mg/kg* u	inless noted			
Oil and Grease Solids, %	100 87	<100 76	<100 92	<100 79	<100 83	
Managainad						

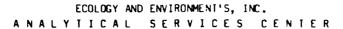
<sup>\*</sup>As received

## Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst:

Date:



# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PESTICIDES/PCBs AND HERBICIDES BY GC (all results in ug/g as received)

U-3800.5

	E & E Lab. No. 86-	5 <del>9</del> 01	5902	5903	5904	5905	5906	5907
Compound	Sample Identity	9015	9016	9017	90 18	9019	9020	9021
Aldrin		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
a-BHC		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
b-BHC		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
g-BHC		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
d-BHC		<1.0	<1.0	<1 <b>.</b> 0	<1.0	<1.0	<1.0	<1.0
Chlordane		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4,4'-DDD		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4.41-DDE		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4,4'-DDT		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dieldrin		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Endosulfan I		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Endosulfan II		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Endosulfan sulfate		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Endrin		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde		<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
Heptachlor		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1016	•	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB ~ 1221	i	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1232	İ	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1242		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1248		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1254		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1260	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toxaphene	İ	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-D		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,5-TP (Silvex)		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,5-1		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PESTICIDES/PCBs AND HERBICIDES BY GC (all results in ug/g as received)

U-3800.6

г		T				1	<del></del>	† - <del></del>	<del> </del>
		E & E Lab. No. 86~	5908	5909+	5910	BL ANK			
	Compound	Sample Identity	9022	9023	9024	7/30/86			
ſ	Aldrin		<1.0	<1.0	<1.0	<1.0			
1	a-BHC		<1.0	<1.0	<1.0	<1.0	ı		
1	b~BHC		<1.0	<1.0	<1.0	<1.0	l	i	1
1	g~BHC		<1.0	<1.0	<1.0	<1.0		ļ	į
1	d-BHC		<1.0	<1.0	<1.0	<1.0			ļ
1	Chlordane		<1.0	<1.0	<1.0	<1.0			
.	4,4'-DDD		<1.0	<1.0*	<1.0	<1.0			Ì
4	4,4'-DDE		<1.0	<1.6*	<1.0	<1.0		1	1
	4,4'-001		<1.0	2.5	<1.0	<1.0			1
۱	Dieldrin		<1.0	<1.0	<1.0	<1.0			ì
1	Endosulfan I		<1.0	<1.0	<1.0	<1.0			
1	Endosulfan II		<1.0	<1.0	<1.0	<1.0			ł
1	Endosulfan sulfate		<1.0	<1.0	<1.0	<1.0			{
	Endrin		<1.0	<1.0	<1.0	<1.0		1	l
1	Endrin aldehyde		<1.0	<1.0	<1.0	<1.0			1
1	Heptachlor		<1.0	<1.0	<1.0	<1.0			
1	Heptachlor epoxide		<1.0	<1.0	<1.0	<1.0		ł	ŀ
1	PCB - 1016		<1.0	<1.0	<1.0	<1.0			ļ
İ	PCB - 1221		<1.0	<1.0	<1.0	<1.0		1	1
1	PCB - 1232		<1.0	<1.0	<1.0	<1.0		1	1
	PCB - 1242		<1.0	<1.0	<1.0	<1.0			1
1	PCB - 1248		<1.0	<1.0	<1.0	<1.0			Ì
	PCB - 1254		<1.0	<1.0	<1.0	<1.0			
1	PCB - 1260		<1.0	<1.0	<1.0	<1.0		]	J
-	Tuxaphene		<1.0	<1.0	<1.0	<1.0			1
	2,4-D		<1.0	<1.0	<1.0	<1.0		•	
	2,4,5-TP(Silvex)		<1.0	<1.0	<1.0	<1.0		i	
	2,4,5-1		<1.0	<1.0	<1.0	<1.0		1	[
1			1			<b>(</b>			1

<sup>\*</sup>Also present but less than CRDL

<sup>+</sup>Sample confirmed - results positive



	E&E	Original Value	Amount Added	Amount Determined			
Parameter	Laboratory No. 86-		(mg/kg)				
Aldrin	5910	<1.0	2.0	1.7	85		
a-BHC	5910	<1.0	2.0	1.7	B5		
b-BHC	5910	<1.0	2.0	1.8	90		
g-BHC	5910	<1.0	2.0	1.7	85		
d-BHC	5910	<1.0	2.0	1.7	85		
4,4'-DDD	5910	<1.0	2.0	1.7	85		
4,4'-DDE	5910	<1.0	2.0	1.7	85		
4,4'-DDT	5910	<1.0	2.0	1.4	70		
Dieldrin	5910	<1.0	2.0	1.6	80		
Endosulfan I	5910	<1.0	2.0	1.7	85		
Endosulfan II	5910	<1.0	2.0	1.7	85		
Endosulfan sulfate	5910	<1.0	2.0	1.6	80		
Endrin	5910	<1.0	2.0	1.7	85		
Endrin aldehyde	5910	<b>∫</b> <1.0	2.0	1.7	85		
Heptachlor	5910	<1.0	2.0	1.9	95		
Heptachlor epoxide	5910	<1.0	2.0	1.7	85		
			į				
			;				

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

### RESULTS OF SOIL ANALYSIS FOR ORGANOPHOSPHOROUS PESTICIDES BY GC

(all results in mg/kg as received)

	E & E Lab. No. 86-	5901	5 <del>9</del> 02	5903	5904	5905	5906	5907
Compound	Sample Identity	9015	9016	9017	9018	9019	9020	9021
Nal ed		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Phorate		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Disulfoton		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorpyrifos		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dimethoate	į	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Malathion		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Mevinphos		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Parathion		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl parathion		<1.0	<1.0	<1.u	<1.0	<1.0	<1.0	<1.0
Diazinon		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl azinphos		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0



### ECULOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

### RESULTS OF SOIL ANALYSIS FOR ORGANOPHOSPHOROUS PESTICIDES BY GC

(all results in mg/kg as received)

	E & E Lab. No. 86-	5908	5909	5910	BLANK		
Compound	Sample Identity	9022	9023	9024	7/30/86		
Naled		<1.0	<1.0	<1.0	<1.0		
Phorate		<1.0	<1.0	<1.0	<1.0		
Di sul foton	1	<1.0	<1.0	<1.0	<1.0		
Chlorpyrifos		<1.0	<1.0	<1.0	<1.0		
Dimethoate	i	<1.0	<1.0	<1.0	<1.0		
Malathion		<1.0	<1.0	<1.0	<1.0	ţ	
Mevinphos	Ì	<1.0	<1.0	<1.0	<1.0		
Parathion		<1.0	<1.0	<1.0	<1.0		
Methyl parathion		<1.0	<1.0	<1.0	<1.0		
Diazinon		<1.0	<1.0	<1.0	<1.0		
Methyl azinphos		<1.0	<1.0	<1.0	<1.0		

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E & E Lab. No. 86-	BLANK	5901	5902	5903	5904
Compound	Sample Identity	8/1/86	9015	9016	9017	<del>9</del> 018
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<b>©</b> 00
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene		<250	<250	<250	<25N	<250
ethylbenzene		<250	<250	<250	<250	<250



### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURCEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E & E Lab. No. 86-	5905	5906	590.7	5908	5909
Compo und	Sample Identity	9019	9020	9021	9022	9023
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene	1,2-dichlorobenzene		<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzen <del>e</del>		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene		<250	<250	<250	<250	<250
e thyl benzene		<250	<250	<250	<250	<250

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

U-3800.12

	E & E Lab. No. 86-	5910	BLANK			
Compo und	Sample Identity	9024	8/4/86			
chlorobenzene		<250	<250			
1,2-dichlorobenzene		<500	<500		ı	, ,
1,3-dichlorobenzene		<500	<500	'		
1,4-dichlorobenzene		<500	<500	ļ		
b <i>e</i> nzene		<250	<250			
total xylenes		<500	<500			
toluene		<250	<250			
ethylb <i>e</i> nzene		<250	<250			

ANTER CONTINUE RECORDS SEESESSES FEESTON CONTINUES CONTINUES RECORDS FEEDER

### QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E & E	Original Value	Amount Added	Amount Determined	
Compound	Laboratory No. 86-		Percent Recovery		
1,2-dichlorobenzene	5910	<500	1250	1069	86
1,3-dichlorobenzene	5910	<500	1250	1234	99
1,4-dichlorobenzene	5910	<500	1250	1088	87
toluene	5910	<250	1250	1198	96
ethyl benzene	5910	<250	1250	1149	92



### QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86-		(ug/g)		Percent Recovery
2,4-D	5910	<1.0	4.0	3.4	85
Silvex	5910	<1.0	4.0	3.2	80
				l	



### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S F R V I C E S C F N T E R

# RESULIS OF SOIL ANALYSIS FOR PURGEABLE HALDCARBON COMPOUNDS BY GC (all results in ug/kg as received)

	E & E Lab. No. 86-	BLANK	5901	5902	5903	5904	5905
Compaund	Sample Identity	8/4/86	9015	9016	9017	9018	9019
carbon tetrachloride		<250	<250	<250	<250	<250	<250
1,2-dichloroethane	ì	<100	<100	<100	<100	<100	<100
1,1,1-trichloroethane	. (	<250	<250	<250	<250	<b>&lt;250</b>	<250
1,1-dichloroethane	į.	<100	<100	<100	<100	<100	<100
1,1,2-trichloroethane		<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloroet	hane	<250	<250	<250	<250	<250	<250
chloroethane	{	<500	<500	<500	<500	<500	<500
2-chloroethylvinyl et	her	<5000	<5000	<5000	<5000	<5000	<5000
chloroform	ſ	<250	<250	<250	<250	<250	<250
1,1-dichloroethene	(	<100	<100	<100	<100	<100	<100
trans-1.2-dichloroeth	ene	<100	<100	<100	<100	<100	<100
1.2-dichloropropane		<1000	<1000	<1000	<1000	<1000	<1000
trans-1,3-dichloropro	pene	<1000	<1000	<1000	<1000	<1000	<1000
cis-1.3-dichloroprope	· · · · · · · · · · · · · · · · · · ·	<1000	<1000	<1000	<1000	<1000	<1000
methylene chlorade	1	<50	<50	<50	<50	<50	<50
chloromethane	<b>{</b>	<500	<500	<500	<500	<500	<500
bromomethane	1	<500	<500	<500	<500	<500	<500
bromoform	1	<1000	<1000	<1000	<1000	<1000	<1000
bromodichloromethane	<b>,</b>	<250	<250	<250	<250	<250	<250
fluorotrichloromethan	e l	<500	<500	<500	<500	<500	<500
dichlorodifluoromethe		<500	<500	<500	<500	<50 <b>0</b>	<500
chlorodibromomethane		<250	<250	<250	<250	<250	<250
tetrachloroethene		<250	<250	<250	<250	<250	<250
trichloroethene		<250	<250	<250	<250	<250	<250
vinyl chloride		<500	<500	<50 <b>0</b>	<500	<500	<500



## RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg as received)

	E & E Lab. No. 86-	5906	5907	5908	5909	5910	BLANK
Compound	Sample Identity	9020	9021	9022	9023	9024	8/5/86
carbon tetrachloride		<250	<250	<250	<250	<250	<250
1,2-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,1-trichloroethar	ne	<250	<250	<25N	<250	<250	<250
1,1-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,2-trichloroethar	ne	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloro	ethane	<250	<250	<250	<250	<250	<250
chloroethane	j	<500	<500	<500	<500	<500	<500
2-chloroethylvinyl	ether	<5000	<5000	<5000	<5000	<5000	<5000
chloroform		<250	<250	<250	<250	<250	<250
1,1-dichloroethene		<100	<100	<100	<100	<100	<100
trans-1,2-dichloroe	thene	<100	<100	<100	<100	<100	<100
1,2-dichloropropane		<1000	<1000	<1000	<1000	<1000	<1000
trans-1,3-dichlorops	ropene	<1000	<1000	<1000	<1000	<1000	<1000
cis-1,3-dichloroprop	pene	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride		<50	<50	<50	<50	<50	<50
chloromethane		<500	<500	<500	<500	<500	<500
bromomethane		<500	<500	<500	<500	<500	<500
bromoform		<1000	<1000	<1000	<1000	<1000	<1000
bromodichloromethan	e [	<250	<250	<250	<250	<250	<250
fluoratrichlorometh	ane	<500	<500	<500	<500	<500	<500
dichlorodifluoromet	nane	<500	<500	<500	<50 <b>0</b>	<50 <b>0</b>	<500
chlorodibromomethan	e	<250	<250	<250	<250	<250	<250
tetrachloroethene	į	<250	<250	<250	<250	<250	<250
trichloroethene		<250	<250	<250	<250	<250	<250
vinyl chloride		<500	<500	<500	<500	<500	<50 <b>0</b>

### QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined	
Compound	Laboratory No. 86-		Percent Recovery		
carbon tetrachloride	5910	<250	1250	973.1	77.8
1,2-dichloroethane	5910	<100	1250	1073	85.8
1,1,1-trichloroethane	5910	<250	1250	982.5	78.6
1,1-dichloroethane	5910	<100	1250	1094	87.5
chloroethane	5910	<500	1250	1334	107
chloroform	5910	<250	1250	1126	90.2
trans-1,2-dichloroethene	5910	<100	1250	1061	84.8
methylene chloride	5910	<50	1250	961.8	76.9
chloromethane	5910	<500	1250	1245	99.6
bromomethane	5910	<500	1250	1188	95.0
bromoform	5910	<1000	1250	1232	98.6
bromodichloromethane	5910	<250	1250	1042	83.4
trichloroethene	5910	<250	1250	1068	85.4

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y 1 I C A L SER V I C E S C E N T E R

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

<del></del>				<del> </del>	<del>                                     </del>	<del></del>
	E & E Lab. No. 86-	5901	5902	5903	5904	5905
Compound	Sample Identity	9015	9016	9017	9018	9019
bis(2-chloroethyl)ether		<1	<b>&lt;</b> 1	<1	<1	<1
1,3-dichlorobenzene		ζί	<1	31	\ \cdot\{1}	<1
1,4-dichlorobenzene		\ \cdot\(\frac{2}{3}\)	<u> </u>	3	<u> </u>	<1
1,2-dichlorobenzene		<1	<1	ξi	₹1	<1
bis(2-chloroisopropyl)ether		\ \cdot\( \cdot\)	ζ1	\ \cdot\( 1	ξ1	<u> </u>
N-nitrosodipropylamine		\ \cdot\(\dot\)	ζ1	ξ1	<1 <1	\ \d
hexachloroethane		31	ζ1	\ \cdot\ 1	<u> </u>	<u> </u>
nitrobenzene		\ \cdot\( \cdot\)	<1	31	<1	<1
isophorone		\ \cdot\( \)	<u> </u>	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	<1	<1
1		\ \cdot\( 1 \)	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	(1)	l .	
bis(2-chloroethoxy)methane		<1	<u> </u>	<1	<1 <1	<1 <1
1,2,4-trichlorobenzene	i	(1	ζ1			
naphthalene				<1 21	<b>&lt;</b> 1	<1
hexachlorobutadiene		<1 .	<1	<1	<1 	<1
hexachlorocyclopentadiene		<1	<1	<1	<1	<1
2-chloronaphthalene		<1	<1	<1	<1	<1
dimethyl phthalate		<1	<1	<1	<1	<1
acenaphthylene		<1	<1	(1	<1	<1
fluorene		<1	<1	<1	<1	<1
acenaphthene		<1	<1	<1	<b>&lt;</b> 1	<1
2,4-dinitrotoluene		<1	<1	<1	<b>&lt;</b> 1	<1
2,6-dinitrotoluene		<1	<1	<1	<1	<1
diethylphthalate		<1	<1	<1	<1	<1
4-chlorophenyl phenyl ether		<1	<1	<1	<1	<1
N-nitrosodiphenylamine		<1	<b>&lt;</b> 1	<1	<1	<1
4-bromopheny ohenyl ether		<b>&lt;</b> 1	<1	<1	<1	<1
hexachloroben∠ene		<1	<1	<1	<1	<1
phenanthrene		<1	<1	<1	<1	<1
anthracene		<1	<1	<b>  &lt;1</b>	<1	<1
di-n-butyl phthalate		<1	<1	<1	<1	<1
fluoranthene		<1	<1	<1	<1	<1
benzidin <del>e</del>		<5	<5	<5	<5	<5
pyrene		<1	<1	<1	<1	<1
butyl benzyl phthalate		<1	<b>&lt;</b> 1	<1	<1	<1
3,3'-dichlorobenzidine		<3	<3	<3	<3	<3
benzo(a)anthracene		<1	<1	<1	<1	<1
bis(2-ethylhexyl)phthalate		<1	<1	<1	<1	<1
chrysene	ı	<1	<1	<1	<1	<1
di-n-octyl phthalate		<1	<1	<1	<1	<1
benzo(b)fluoranthene		<1	<1	<1	<1	<1
benzo(k)fluoranthene		<1	<1	<1	<1	<1
benzo(a)pyrene		<1	<1	<1	<1	<1
indeno(1,2,3-cd)pyrene	i	<1	<1	<1	<1	<1
dibenzo(a,h)anthracene		<1	<1	<1	<1	<1
benzo(ghi)perylene		<1	<1	<1	<1	<1
		L	L	<u> </u>		

<sup>\*</sup>Compound present below measurable detection limit

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

## RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

	E&E Lab. No. 86-	5901	5902	5903	5904	5905
Compound	Sample Identity	9015	9016	9017	90 18	9019
phenol		<1	<b>&lt;</b> 1	<1	<b>&lt;</b> 1	<1
2-chlorophenol		<1	<1	<1	<1	<b>&lt;</b> 1
2-nitrophenol		<1	<1	<b>&lt;</b> 1	<1	<1
2,4-dimethylphenol	ľ	<1	<1	<b>&lt;</b> 1	<b>&lt;</b> 1	<1
2,4-dichlorophenol		<1	<1	<1	<1	<1
4-chloro-3-methylphenol		<1	<b>&lt;</b> 1 .	<1	<1	<1
2,4,6-trichlorophenol		<1	<b>&lt;</b> 1	<1	<b>&lt;</b> 1	<1
2,4-dinitrophenol		<b>(3</b>	<3	<3	<3	<3
4-nitrophenol		<1	<1	<1	<1	<1
4,6-dinitro-2-methylphenol		<3	<3	<3	<3	<3
pentachlorophenol		<3	<3	<3	<3	<3

<sup>\*</sup>Compound present below measurable detection limit.

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

Compound   Sample   1,3-dichloroethyl)ether   1,3-dichlorobenzene   1,4-dichlorobenzene   1,4-dichlorobenzene   1,4-dichlorobenzene   1,4-dichlorobenzene   1,4-dichlorobenzene   1,4-dichlorobenzene   1,4-dichlorobenzene   1,4-dichlorobenzene   1,4-dichlorobenzene   1,4-dichlorobenzene   1,4-dichlorobenzene   1,4-dichlorobenzene   1,5-dichlorobenzidine   1,5-		
Dis(2-chloroethyl)ether	5909	5910
1,3-dichlorobenzene 1,4-dichlorobenzene 1,2-dichlorobenzene 1,2-dichlorobenzene 1,2-dichlorobenzene 1,3-dichlorobenzidine 1,3-	9023	9024
1,3-dichlorobenzene	<1	<1
1,4-dichlorobenzene	<1	<1
1,2-dichlorobenzene bis(2-chloroisopropyl)ether C1 C1 C1 N-nitrosodipropylamine hexachloroethane C2 C1 C1 C1 nitrobenzene C3 C1 C1 sisophorone C4 C1 C1 sisophorone C5 C1 C1 C1 c1 C	1 8	\ \cdot\( \cdot\)
bis(2-chloroisopropyl)ether N-nitrosodipropylamine C1 C1 C1 N-nitrosodipropylamine C2 C1 C1 C1 N-nitrobenzene C3 C1 C1 C1 N-nitrobenzene C4 C1 C1 C1 N-nitrobenzene C5 C1 C1 C1 N-nitrobenzene C6 C1 C1 C1 N-nitrobenzene C7 C1 C1 C1 N-nitrosodiphenylamine C8 C1 C1 C1 N-nitrosodiphenylamine C9 C1 C1 C1 N-nitrosodiphenylamine C1 C1 C1 N-nitrosodiphenylamine C2 C1 C1 C1 N-nitrosodiphenylamine C3 C1 C1 C1 N-nitrosodiphenylamine C4 C1 C1 C1 N-nitrosodiphenylamine C5 C1 C1 C1 N-nitrosodiphenylamine C6 C1 C1 C1 N-nitrosodiphenylamine C7 C1 C1 C1 N-nitrosodiphenylamine C8 C1 C1 C1 N-nitrosodiphenylamine C9 C1 C1 C1 N-nitrosodiphenylamine C9 C1 C1 C1 N-nitrosodiphenylamine C9 C1 C1 C1 N-nitrosodiphenylamine C9 C1 C1 C1 N-nitrosodiphenylamine C9 C1 C1 C1 N-nitrosodiphenylamine C9 C1 C1 C1 N-nitrosodiphenylamine C9 C1 C1 N-nitrosodi	1 8	1 3
N-nitrosodipropylamine	1 3	1 3
hexachloroethane         (1	31	3
nitrobenzene         <1	31	31
isophorone bis(2-chloroethoxy)methane 1,2,4-trichlorobenzene naphthalene hexachlorobutadiene hexachlorocyclopentadiene 2-chloronaphthalene dimethyl phthalate acenaphthylene fluorene acenaphthene 2,4-dinitrotoluene diethylphthalate diethylphthal	\ \\ \\ \\ \\ \	
bis(2-chloroethoxy)methane         <1	1	<1
1,2,4-trichlorobenzene	<1	<b>(1</b>
naphthalene         C1         C1         C1           hexachlorobutadiene         C1         C1         C1           hexachlorocyclopentadiene         C1         C1         C1           2-chloronaphthalene         C1         C1         C1           dimethyl phthalate         C1         C1         C1           acenaphthylene         C1         C1         C1         C1           fluorene         C1	<1	<1
hexachlorobutadiene         (1)         (1)         (1)           hexachlorocyclopentadiene         (1)         (1)         (1)           2-chloronaphthalene         (1)         (1)         (1)           dimethyl phthalate         (1)         (1)         (1)           acenaphthylene         (1)         (1)         (1)         (1)           fluorene         (1)         (1)         (1)         (1)           acenaphthylene         (1)         (1)         (1)         (1)           genaphthylene         1)         (1) <td< td=""><td>&lt;1</td><td>&lt;1</td></td<>	<1	<1
hexachlorocyclopentadiene         <1	<1	<1
2-chloronaphthalene       <1	<1	<1
dimethyl phthalate       <1	<b>\ &lt;1</b>	<1
acenaphthylene fluorene acenaphthene cquare	<1	<1
fluorene       <1	<1	<1
acenaphthene       <1	<1	<1
2,4-dinitrotoluene       <1	<1	<1
2,6-dinitrotoluene       <1	<1	<1
diethylphthalate       C1       C1       C1         4-chlorophenyl phenyl ether       C1       C1       C1         N-nitrosodiphenylamine       C1       C1       C1         4-bromaphenyl phenyl ether       C1       C1       C1         hexachlorobenzene       C1       C1       C1         phenanthrene       C1       C1       C1         anthracene       C1       C1       C1         di-n-butyl phthalate       C1       C1       C1         fluoranthene       C1       C1       C1         benzidine       C5       C5       C5         pyrene       C1       C1       C1         butyl benzyl phthalate       C1       C1       C1         benzo(a) anthracene       C1       C1       C1         bis(2-ethylhexyl)phthalate       C1       C1       C1         chrysene       C1       C1       C1         di-n-octyl phthalate       C1       C1       C1         benzo(b)fluoranthene       C1       C1       C1	<1	<1
4-chlorophenyl phenyl ether       <1	1 <1	l <1
4-chlorophenyl phenyl ether       <1	<1	<1
N-nitrosodiphenylamine 4-bromophenyl phenyl ether 61	<1	3
4-bromophenyl phenyl ether       <1	<1	\ \cdot \( \cdot \)
hexachlorobenzene       <1	<1	\ \z\i
phenanthrene       <1	<1	<1
anthracene       <1	<1	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
di-n-butyl phthalate       <1	\ \z\(\cdot\)	31
fluoranthene       <1	1 3	31
benzidine       <5	1 2	1 3
pyrene       <1	3	(5
butyl benzyl phthalate       <1		1
3,3'-dichlorobenzidine       <3	<1	<1
benzo(a)anthracene       <1		<1
bis(2-ethylhexyl)phthalate       <1	(3	(3
chrysene       <1	<1	<1
di-n-octyl phthalate	<1	<1
benzo(b)fluoranthene <1 <1 <1	<1	<1
) 1 1 1	<1	<1
benzo(k)fluoranthene   <1   <1   <1   <1	<1	<1
1 1	<1	<1
benzo(a)pyrene <1 <1 <1	<1	<1
indeno(1,2,3-cd)pyrene <1 <1 <1	<1	<1
dibenzo(a,h)anthracene <1 <1 <1	<1	<1
benzo(ghi)perylene <1 <1 <1	<1	<1

<sup>\*</sup>Compound present below measurable detection limit

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

### RESULTS OF BLANK ANALYSIS FOR PRIORITY POLLUTANI BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/L)

Compound	Sample Identity	BLANK				
bis(2-chloroethyl)ether		<10		-		
1,3-dichlorobenzene		<10 <10				1
1,4-dichlorobenzene		<10 <10				}
1,2-dichlorobenzene		<10 <10				i
bis(2-chloroisopropyl)ether		<10				ŀ
N-nitrosodipropylamine		<10 <10				
hexachloroethane	į	<10 <10				j
nitrobenzene		<10 <10				
isophorone		<10 <10				
bis(2-chloroethoxy)methane		<10 <10				
1,2,4-trichlorobenzene		<10 <10				ļ
naphthalene		<10 <10				
hexachlorobutadiene		<10 <10				
hexachlorocyclopentadiene		<10 <10				ļ
2-chloronaphthalene		<10 <10				
dimethyl phthalate		<10			}	j
acenaphthylene		<10				į
fluorene		<10 <10				İ
acenaphthene		<10 <10				
2,4-dinitrotoluene		<10 <10				
2,6-dinitrotoluene		<10 <10				
diethylphthalate	ı	<10 <10				
4-chlorophenyl phenyl ether		<10				ĺ
N-nitrosodiphenylamine		<10				ļ
4-bromophenyl phenyl ether		<10				İ
hexachlorobenzene		<10 <10				
phenanthrene		<10				Ì
anthracene		<b>&lt;10</b>				}
di-n-butyl phthalate		<10				ŀ
fluoranthene		<10				
benzidine		<50			ĺ	
pyrene		<10				
butyl benzyl phthalate		<10				
3,3'-dichlorobenzidine		<30	İ		ŀ	
benzo(a) anthracene		<10				
bis(2-ethylhexyl)phthalate		<10			İ	
chrysene		<10				
di-n-octyl phthalate		<10				
berizo(b)fluoranthene		<10				
benzo(k)fluoranthene		<10		1		
benzo(a)pyrene		<10	-			
indeno(1,2,3-cd)pyrene		<10	]			
dibenzo(a,h)anthracene		<10				
benzo(ghi)perylene		<10				

<sup>\*</sup>Compound present below measurable detection limit

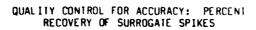


### RESULTS OF BLANK ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/L)

	£ & E Lab. No. 86-	METHOD BLANK			
Compound	Sample Identity				
phenol		<10			
2-chlorophenol		<10	i		
2-nitrophenal		<10			
2,4-dimethylphenol		<10			İ
2,4-dichlorophenol		<10	ļ		
4-chloro-3-methylphenol		<10		į	
2,4,6-trichlorophenol		<10			i
2,4-dinitrophenol		<30			•
4-nitrophenol		<10	ļ		
4,6-dinitro-2-methylphenol		<30	Ì		
pentachlorophenol		<30			
					-

<sup>\*</sup>Compound present below measurable detection limit.



U-3800.23

	E&E	Amount Added	Amount Determined	
Compound	Laboratory No. B6-		(mg/kg)	Percent Recovery
Nitrobenzene-D5	5901 5902 5903 5904 5905 5906 5907 5908 5909 5910	3.3 3.3 3.3 3.3 3.3 3.3 3.3 3.3 3.3	1.6 2.6 2.2 1.5 1.9 2.1 2.0 1.6 1.9 2.0	48.5 78.8 66.7 45.5 57.8 63.6 60.6 48.5 57.8 60.6
2-fluorobiphenyl	5901 5902 5903 5904 5905 5906 5907 5908 5909	3.3 3.3 3.3 3.3 3.3 3.3 3.3 3.3 3.3	2.5 3.0 2.9 2.4 2.7 2.9 2.9 2.3 3.0 3.0	75.8 90.9 87.9 72.7 81.8 87.9 87.9 69.7 90.9
terphenyl-D14	5901 5902 5903 5904 5905 5906 5907 5908 5909 5910	3.3 3.3 3.3 3.3 3.3 3.3 3.3 3.3 3.3	2.2 3.1 2.8 2.3 2.5 2.6 2.8 2.4 2.4	66.7 93.9 84.8 69.7 75.6 78.8 84.8 72.7 72.7

These recoveries are acceptable to EPA Contract Lab Program (CLP) guidelines.

### QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY OF SURROGATE SPIKES

\$\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\					
		Y CONTROL FOR ECOVERY OF SUR			
					U-380
		E & E	Amount Added	Amount Determined	
	Compound	Laboratory No. 86-		(mg/kg)	Percent Recover
	phenol-D5	5901	6.6	2.1	31.8
		5902	6.6	4.7	71.2
		5903 5904	6.6	3.2 2.1	48.5 31.8
	į.	5905	6.6	2.4	36.4
		5906	6.6	3.3	50.0
		5907 5908	6.6	3.2 2.5	48.5 37.9
		5909	6.6	2.3	34.8
		5910	6.6	2.1	31.8
Ģ	2-fluorophenol	5901 5902	6.6	1.6 5.8	24.2 87.9
		5903	6.6	2.2	33.3
		5904	6.6	1.6	24.2
		5905	6.6	1.8	27.3
		5906 5907	6.6	2.7	40.9 33.3
		5908	6.6	2.0	30.3
		590 <b>9</b>	6.6	1.5	22.7
		5910	6.6	1.4	21.2
	2,4,6-tribromophenol	5901	6.6	1.9	28.8
		5902 5903	6.6	2.0	30.3 50.0
	1	5904	6.6	2.2	33.3
		5905	6.6	3.2	48.5
		5906 5907	6.6	2.9	43.9
		590 <i>7</i> 590 <b>8</b>	6.6	3.0	45.5 43.9
		5909	6.6	1.6	24.2
		5910	6.6	<1	<15
					L
	With the exception of poo	or 2-fluoroohe	nol and 2.	4.6-tribramaphe	enol
	recoveries in sample 5910	, these recove	eries are	acceptable to 8	PA Contra
415	Lab Program (CLP) guideli	ines.			
		11 6	17		
		H-9	17		

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

CONTROL OF THE PROPERTY OF THE

		mg/	kg	Relative
Compound	E & E Lab. No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
bis(2-chloroethyl)ether		<1	<1	
1,3-dichlorobenzene	<b>!</b>	<1	<1	
1,4-dichlorobenzene	1	<b>&lt;</b> 1	<b>&lt;</b> 1	
1,2-dichlorobenzene		<1	<1	
bis(2-chloroisopropyl)ether		<1	<1	
N-nitrosodipropylamine	<b>!</b>	<1	<1	
hexachloroethane		<1	<1	
nitrobenzene	[	<1	<1	
isophorone	1	<1	<1	<b>!</b>
bis(2-chloroethoxy)methane	1	<b>&lt;</b> 1	<1	
1,2,4-trichlorobenzene	1	<1	<1	
naphthalene	1	<1	<1	
hexachlorobutadiene	[	<1	<1	
hexachlorocyclopentadiene	<b>[</b>	<1	<1	
2-chloronaphthalene	,	<1	<1	
dimethyl phthalate		<1	<1	
acenaphthylene	!	<1	<1	
fluorene	]	<1	<1	
acenaphthene	1	<1	<1	
2,4-dinitrotoluene	1	<b>&lt;</b> 1	<1	
2,6-dinitrotaluene	1	<1	<1	
diethylphthalate	f ·	<1	<1	
4-chlorophenyl phenyl ether	1	<b>&lt;</b> 1	<1	
N-nitrosodiphenylamine	1	<1	<1	
4-bromophenyl phenyl ether	1	<1	<1	
hexachlorobenzene		<1	<1	
phenanthrene	<b>i</b>	<1	<1	
anthracene	· ·	<1	<1	
di-n-butyl phthalate	1	<1	<1	
fluoranthen <b>e</b>	1	<b>&lt;</b> 1	<1	
benzidin <b>e</b>	]	<5	<5	
pyrene		<b>&lt;</b> 1	<1	
butyl benzyl phthalate	ſ	<b>&lt;</b> 1	<b>&lt;</b> 1	
3,3'-dichlorobenzidine		<3	<3	
benzo(a)anthracene		<b>&lt;</b> 1	<1	
bis(2-ethylhexyl)phthalate	<b>\</b>	<1	<1	
chrysene	i	<1	<1	
di-n-octyl phthalate		<1	<1	
benzo(b)fluoranthene	i	<1	<1	
benzo(k)fluoranthene		<b>&lt;</b> 1	<b>&lt;</b> 1	
benzo(a)pyrene		<1	ζ1	
indeno(1,2,3-c,d)pyrene	i	<1	<1	l <u></u>
dibenzo(a,h)anthracene	l	<1	<1	
benzo(g,h,i)perylene		ζ1	<b>&lt;</b> 1	
· · ·	1		,,	



#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

		mg/	Relative	
Compound	E&E Lab. No. 86~ 5905	Original Analysis	Replicate Analysis	Percent Difference (RPD)
phenol		<b>&lt;</b> 1	<1	
2-chlorophenol		<1	<1	
2-nitrophenol		<1	<b>&lt;</b> 1	<del></del>
2,4-dimethylphenol		<1	<1	<b></b>
2,4-dichlorophenol		<1	<1	<b></b>
4-chloro-3-methylphenol		<1	<1	
2,4,6-trichlorophenol		<1	<1	
2,4-dinitrophenol		(3	<3	
4-nitrophenol		<1	<1	
4,6-dinitro-2-methylphenol		(3	<3	<b></b>
pentachlorophenol		<3	<3	



	E&E	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86-		(mg/kg)		Percent Recovery
Diazinon	5910	<1.0	21.1	18.5	88
Oil and Grease	5903	<100	4630	5250	113
		}			



### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

		(	%)	Relative
Parameter	E&E Laboratory No.86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Solids	5902	88	89	1.1
		,		

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

U-3800.29

	E & E Lab. No. 86-	5906	5907	5908	5909	5910
Compound	Sample Identity	9020	9021	9022	9023	9024
phenol		<1	<1	<b>&lt;</b> 1	<b>&lt;</b> 1	<b>&lt;</b> 1
2-chlorophenol		<1	<1	<1	<1	<1
2-nitrophenol		<1	<1	<1	<1	<1
2,4-dimethylphenol		<1	<1	<1	<1	<1
2,4-dichlorophenol		<1	<1	<1	<1	<1
4-chloro-3-methylphenol		<1	<1	<1	<1	<1
2,4,6-trichlorophenol		<1	<1	<1	<1	<1
2,4-dinitrophenol		(3	<3	<3	<3	<3
4-nitrophenol		<1	<1	<1	<1	<1
4,6-dinitro-2-methylphenol		<3	<3	<3	<3	<3
pentachlorophenol		<3	(3	<3	<3	<3

<sup>\*</sup>Compound present below measurable detection limit.



### SAMPLE IDENTIFICATION CROSS-REFERENCE

U-3880

Laboratory Number 86-	Field Number	Field Location
6428	9007	0165-S0-001-GS-86-9007



SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3880.1

	Pet. HC(28)	Anal	;	
	Pet.	Dead	1	
	0&G(28)	Anal	5/6	
	046	Dead	4/6	
	105 (7)	Anal	1	
	10S	Dead	;	
	/8 i 8	Anal	8/15	
+ 40)	Analysis	Dead	9/21	
BNA(14/E + 40)	tion	Extr	8/12	
	Extraction	Dead	8/21	
	Analysis	Dead Anal	:	
PAH (7/5 + 30)	Anal	Dead	:	
PAH (7/	Extraction	Dead Extr	:	
	Extra	Dead	;	
	- el cmg	Date	6/7	
	9 (4 8 9 )	Number	6428	
	4	3	3880	

DEAD: EXTR: ANAL: ( ): S+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time.
Holding time expiration based on sample date.
Holding time expiration based on extraction date.

SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

		-+	
	/818	Anal	1
E+30)	Analysis	Dead	1
Phenols(7/E+30)	tion	Extr	1
ag	Extraction	Dead Extr	1
	sis	Anal	8/14
/5+14)	Analysis	Dead Anal	8/21
Organophos(7/5+14)	100	Extr	8/13
Organ	Extraction	Dead	41/4
	<del></del>		8/18
£+40)	Analysis	Dead Anal	9/22
Pest/PCB(7/E+40)	ion	-	8/13
Pest,	Extraction	Dead Extr	41/8
		Anal	8/13
30)	Analysis	Dead /	9 /10
Herb(7/E+		-	
위	Extraction	Extr	11/8
	Extr	Deud	8/14
	14)	Anal	8/11,12
	V0A(14)	Dead	8/21
	Samo	Date	8/7
		Number	9428
	Ę	$\dashv$	₩ H-105
Ĺ	<del> </del>		11-100

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Halding time expires.
Halding time based on sample date.
Halding time based on sample extraction. EXTR: EXTR: ANAL: S+P: L+P:



#### LABORATORY REPORT



#### REESE AIR FORCE BASE

U-3880.3

Job No.: U-3880			RE:	DF-20	000	
Sample Date: 8/7/86			P.O. No.:			
Date Received: 8/8/86			Sampled E	By: E&E	, Inc.	
Sample Type: Soil			Delivered	l By: Feder	al Express	
E & E Lab. No. 86-	6428					
Customer No.	9007					
Sample Identity						
Results in: mg/kg,					1	
	Results i	n: mg/kg,	as received	unless not	:ed	
Oil and Grease	Results i	n: mg/kg,	as received	unless not	ed	
Oil and Grease		n: mg/kg,	as received	unless not	ed	
	<100	n: mg/kg,	as received	unless not	ed	
	<100	n: mg/kg,	as received	unless not	ed	
	<100	n: mg/kg,	as received	unless not	ed	
	<100	n: mg/kg,	as received	unless not	ed	

### Analytical References:



### ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

### RESULTS OF SOIL ANALYSIS FOR ORGANOPHOSPHOROUS PESTICIDES BY GC

(all results in ug/g, as received)

		E & E Lab. No. 86-	6428	Blank			
	Compound	Sample Identity	9007	8/13/86			
Ì	Naled		<1.0	<1.0			
1	Phorate		<1.0	<1.0			
	Disulfoton		<1.0	<1.0			
	Chlorpyrifos		<1.0	<1.0			
╽	Dimethoate		<1.0	<1.0			
١	Malathion	·	<1.0	<1.0			
	Mevinphos	:	<1.0	<1.0			
	Parathion		<1.0	<1.0			
-	Methyl parathion		<1.0	<1.0	'		
	Diazinon		<1.0	<1.0			
ļ	Methyl azinphos	ļ	<1.0	<1.0			





### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E & E Lab. No. 86-	Blank	6428		
Compound	Sample Identity	8/11/86	9007		
chlorobenzene		<250	<250		
1,2-dichlorobenzene	1,2-dichlorobenzene				
1,3-dichlorobenzene		<500	<500		
1,4-dichlorobenzene		<500	<500		
benzene		<250	<250		
total xylenes		<500	<500	!	
tnº lene		<250	<250		
rylbenzene		<250	<250		<u> </u>



### ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

# RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg, as received)

	E & E Lab. No. 86-	Blank	6428				
Compound	Sample Identity	8/12/86	9007				
carbon tetrachloride		<250	<250				
1,2-dichloroethane	Į.	<100	<100		}	ł	}
1,1,1-trichloroethane	,	<250	<250		1	İ	ŀ
1,1-dichloroethane		<100	<100	}		1	)
1,1,2-trichloroethane	,	<500	<500	ł			
1,1,2,2-tetrachloroet	:hane	<250	<250		]	Ì	
chloroethane		<500	<500	ŀ	}	J	
2-chloroethylvinyl et	her.	<5000	<5000	[	{		
chloroform	1	<250	<250		1		
1,1-dichloroethene		<100	<100		ļ	J	Ì
trans-1,2-dichloroeth	nene	<100	<100			ļ	
1,2-dichloropropane		<1000	<1000		İ		}
trans-1,3-dichloropro	pene	<1000	<1000	1	1	l	l
cis-1,3-dichloroprope	ene	<1000	<1000	ì	ì		1
methylene chloride		<50	<50	}			
chloromethane		<500	<500	i	1		1
bromomethane		<500	<500				1
bromoform		<1000	<1000		İ		
bromodichloromethane		<250	<250	ĺ	ĺ		Ì
fluorotrichloromethan	ne	<500	<500	}	1	Ì	)
dichlorodifluorometha	ane	<500	<500	ì	]	ì	J
chlorodibromomethane		<250	<250	1		ł	
tetrachloroethene		<250	<250				
trichloroethene		<250	<250	1	1	1	1
vinyl chloride		<500	<500			}	



### ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

## RESULIS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PESTICIDES, PCBs AND HERBICIDES

(all results in mg/kg, as received)

Compound  Aldrin a-BHC b-BHC g-BHC d-BHC Chlordane 4,4'-DDD 4,4'-DDE 4,4'-DDI Dieldrin Endosulfan I	Sample Identity	9007	8/13/86					
a-BHC b-BHC g-BHC d-BHC Chlordane 4,4'-DDD 4,4'-DDE 4,4'-DDT Dieldrin								
b-BHC g-BHC d-BHC Chlordane 4,4'-DDD 4,4'-DDE 4,4'-DDI Dieldrin			<1.0					
g-BHC d-BHC Chlordane 4,4'-DDD 4,4'-DDE 4,4'-DDT Dieldrin		<1.0	<1.0					
1-BHC Chlordane 4,4'-DDD 4,4'-DDE 4,4'-DDT Dieldrin	i	<1.0	<1.0			1		
Chlordane 4,4'-DDD 4,4'-DDE 4,4'-DDT Dieldrin	j	<1.0	<1.0					ļ
4,4'-DOD 4,4'-DDE 4,4'-DDT Dieldrin		<1.0	<1.0				1	
4,4'-DDE 4,4'-DDT Dieldrin	-	<1.0	<1.0					
4,4'-DDT Dieldrin		<1.0	<1.0	-				
Dieldrin		<1.0	<1.0					j
		<1.0	<1.0					
Indosulfan I		<1.0	<1.0				ļ <sup>1</sup>	İ
		<1.0	<1.0					ĺ
Endosulfan II		<1.0	<1.0				j ,	ĺ
Endosulfan sulfate		<1.0	<1.0				1	ĺ
Endrin		<1.0	<1.0				<b>[</b>	ĺ
Endrin aldehyde		<1.0	<1.0					i
Heptachlor		<1.0	<1.0		i i			ĺ
Heptachlor epoxide		<1.0	<1.0	}	}	1	1	
PCB - 1016		<1.0	<1.0				,	
PCB - 1221		<1.0	<1.0			Ï	į	
PCB - 1232		<1.0	<1.0	}	j	j	!	ĺ
PCB - 1242		<1.0	<1.0		}			ĺ
PCB - 1248		<1.0	<1.0	(	<b>[</b>	l	<u> </u>	l
PCB - 1254		<1.0	<1.0			]		]
PCB - 1260		<1.0	<1.0	İ				
Toxaphene		<1.0	<1.0				1	
2,4-D		<1.0	<1.0		İ	1	,	
2,4,5-IP (Silvex)		<1.0	<1.0	1	1	i		İ
2,4,5-1		<1.0	<1.0	l	ì	1	1	i

### QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	FAF	Original Amount Amount Value Added Determined E & E					
Parameter	Laboratory No. 86-		(ug/g)				
2,4-D	6428	<1.0	4.0	3.7	93		
Silvex	6428	<1.0	4.0	2.9	73		
		'					

### ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

	E & E Lab. No. 86-	6428	Method Blank			
Compound	Sample Identity	9007	ug/L			
phenol		<b>&lt;</b> 1	<10			
2-chlorophenol		<1	<10			
2-nitrophenol	ì	<1	<10			i
2,4-dimethylphenol		<1	<10		i	Ì
2,4-dichlorophenol	}	<1	<10		ļ	}
4-chloro-3-methylphenol		<1	<10			1
2,4,6-trichlorophenol		<1	<10	Ì	)	1
2,4-dinitrophenol		<3	<30	ļ		ļ
4-nitrophenol		<1	<10	}	ł	1
4,6-dinitro-2-methylphenol		<3	<30			•
pentachlorophenol	Į	<3	<30	Ì	l	

<sup>\*</sup>Compound present below measurable detection limit.



### QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY OF SURROGATE SPIKES

U-3880.11

	E & E	Amount Added	Amount Determined		
Compound	Laboratory No. 86∽	(mg/kg)		Percent Recovery	
nitrobenzene-D5	6428	3.3	2.2	66.7	
2-fluorobiphenyl	6428	3.3	3.6	109	
terphenyl-D14	6428	3.3	2.5	75.8	
phenol-D5	6428	6.6	2.9	43.9	
2-fluorophenol	6428	6.6	1.7	25.8	
2,4,6-tribromophenol	6428	6.6	3.5	53.0	

These recoveries are acceptable to  $\ensuremath{\mathsf{EPA}}$  Contract Lab Program (CLP) guidelines.



#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

		(	Relative		
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)	
Solids	6489*	70	70	0	

<sup>\*</sup>This represents 10% QC. This is not one of your samples but was analyzed in the same batch as your samples.



## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

Parameter Oil and Grease					
QUA	ALITY CONTROL FOR A	ACCURACY: PE	CRCENT RECO	OVERY	
	100 3. 202	.5 3512 37411			u-3880.
		Original	Amount	Amount	
	E & E Laboratory	Value	Added	Determined	Percent
Parameter	No. 86-		(mg/kg)	)	Recover
Oil and Grease	7023*	160	4530	5440	116
			1		

<sup>\*</sup>This represent 10% QC. This is not one of your samples but was analyzed in the same batch as your samples.

KORVICE GLOSSIS - NOODAN BYYYYYY BOXYYYY BOXYYYY BYYYYYY



# SAMPLE IDENTIFICATION CROSS-REFERENCE

U-3818

Laboratory Number 86-	Field Number	Field Location
6004	9033	0165-S0-002-GS-86-9033
6005	9034	0165-S0-002-GS-86-9034
6006	9035	0165-S0-002-GS-86-9035
6007	9036	0165-S0-002-GS-86-9036
6008	9037	0165-S0-002-GS-86-9037
6009	9038	0165-S0-002-GS-86-9038
6010	9039	0165-S0-002-GS-86-9039
6011	9040	0165-S0-002-GS-86-9040
6012	9164	0165-S0-002-GS-86-9164
6013	9165	0165-S0-002-GS-86-9165
6014	9166	0165-S0-002-GS-86-9166

CONTRACTOR CONTRACTOR CONTRACTOR

						Herb(7/E+30)	/E+30)		B	Pest/PCB(7/E+40)	/E+40)		Organ	Organophos(7/5+14)	7/5+14)		£	Phenols (7/E+30)	£+30)	
, 				V0A(14)	Extr	Extraction	Analysis	1818	Extraction	tion	Analysis	ets	Extraction	E S	Analysis	918	Extraction	tion	Analysis	3
gor	Number	Semple	Dead	Anal	Dead	Extr	Dead	Anal	Dead	Extr	Dead Anel	Anel	Dead	Extr	Dead	Anal	Deed	Extr	Dead	Anel
3818	6004	7/31	8/14	8/5	;	-	:	1	1	1	1	1	1		1	1	6/8	8/2	8/6	8/11
	6005	1/31	8/14	8/5,6		;	1	1	1	1	1	1	1	1	ı	1	7/8	8/2	8/6	11/8
	9009	1/31	8/14	8/5,4		;	1	1	1	1	ı	1	ı	1	1	ı	6/1	8/5	8/6	11/8
	2009	7/31	8/14	8/5,6	1	- 	1	1		;	1	 	1	ı	1	1	8/1	8/8	\$/6	11/8
	8009	1/31	8/14	8/5,6	1	1	1	1	-	1	ı	1	ı	ı	ı	;	1/8	8/2	8/6	8/12
	6009	1/31	8/14	8/2,6	1	1	1	1	1	1	1	-	1	1	1	ł	6/1	8/5	8/6	8/12
	6010	7/31	8/14	8/5,4	;	1	1	1	1	1	1	1	1	- 	1	1	8/1	8/2	٥/4	8/12
	6011	1/31	8/14	8/5,6	1	1	1	1	1	ł	ļ		ı	1	1	1	8/7	8/8	9/6	8/12
ł															-				<del>.</del>	
H-11	DEAD: D	Date sample holding time expires.	e holdi	ng time	expire	98.	•													
8		Data samola was extracted.	A 863	xtracte	ď.															

Date sample was extracted. Date sample was analyzed. DEAD: EXTR: ANAL: ( ): S+#: E+#:

Holding time tess Holding time based on sample date. Holding time based on sample extraction.

REPRESENT RECORDED ASSESSORS TRANSPORT FOR SESSORS FRANCES SESSORS FOR FRANCES FOR STATE FOR



# SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3818.16

	_			_	_	_		_		
HC(28)	Anel	I	1	1	1	1	ł	1	1	
Pet.	Dead	1	1	1	1	ı	1	1	ļ	
(28)	Anal	8/4	8/4	8/4	8/4	8/4	8/4	8/4	8/4	
080	Dead	8/22	8/22	8/22	8/22	8/22	8/22	8/22	8/22	
<u>E</u>	Anal	1	1	1	1	1	1	1	1	
5	Dead	1	1	1	1	1	1	1	;	
yais	Anal	ł	l	1	1	1	1	;	1	
Anal	Dead	1	1	1	1	1	1	1	1	
ction	Extr	1	1	1	i	1	ł	1	1	
Extra	Dead	ŀ	1	1	-	1	!	1	1	
yeis	Anal	-	1	1	1	1	1	;	1	
Anal	Dead	ŀ	1	!	+		1	1	١	
ction	Extr	1	1	1	1	!	1	!	1	
Extra	Dead	1	1	!	1	1	;	1		
Semole	Date	1/31	7/31	7/31	1/31	1/31	1/31	1/31	1/31	
Semo)	Number	6004	6009	9009	2009	8009	6009	6010	6011	
2		U-3818								
	Comp	Analysis Extraction Analysis TDS (7) 046(28) Pet. HC r Dead Anal Dead Anal Dead Anal Dead Anal Dead	Sample Sample         Extraction         Analysis         Extraction         Analysis         Extraction         Analysis         TOS (7)         OAG(28)         Pet. HC           Number         Date         Dead         Extr         Dead         Extr         Dead         Anal         Dead	Sample Number         Sample Sample         Extraction Dead         Analysis         Extraction Extraction         Analysis         TOS (7)         OAG(28)         Pet. HC           6004         7/31               8/22         8/4            6005         7/31               8/22         8/4	Sample Number         Sample Sample         Extraction         Analysis         Extraction         Analysis         Extraction         Analysis         TOS (7)         OAG(28)         Pet. HC           Number         Date         Date         Extraction         Anal         Dead         Extr         Dead         Anal         Dea	Sample Number         Sample 6004         T/31         —         —         —         —         —         —         Pet. HC         Pet. HC           6006         7/31         —         —         —         —         —         —         B/22         B/4         —           6006         7/31         —         —         —         —         B/22         B/4         —           6007         7/31         —         —         —         —         —         B/22         B/4         —           6007         7/31         —         —         —         —         —         —         B/22         B/4         —	Sample Number         Sample Dead         Extraction         Analysis         Extraction         Analysis         TOS (7)         OAG(28)         Pet. HC           6004         7/31	Sample Number         Sample Dead         Extraction         Analysis         Extraction         Analysis         TOS (7)         OAG(28)         Pet. HC           6004         7/31	Sample Number         Sample Dead         Extraction         Analysis         Extraction         Analysis         TOS (7)         OAG(28)         Pet. HC           6004         7/31	Sample Number         Sample Dead         Extraction         Analysis         Extraction         Analysis         TOS (7)         OAG(28)         Pet. HC           6004         7/31         —         —         —         —         —         —         B/22         B/4         —           6005         7/31         —         —         —         —         —         —         B/22         B/4         —           6006         7/31         —         —         —         —         —         B/22         B/4         —           6008         7/31         —         —         —         —         —         —         B/22         B/4         —           6008         7/31         —         —         —         —         —         —         B/22         B/4         —           6008         7/31         —         —         —         —         —         —         B/22         B/4         —           6010         7/31         —         —         —         —         —         —         B/22         B/4         —           6010         7/31         —         —         —         —

DEAD: EXTR: ANAL: ( ): S+#: E+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time.
Holding time expiration based on sample date.
Holding time expiration based on extraction date.



## LABORATORY REPORT

#### FOR

## REESE AIR FORCE BASE

U-3818.1

Job No.: U-3818	)		RE:	DF-20	100	
Sample Date: 7/31/8	6		P.O. No.:	:		
Date Received: 8/1/86	;		Sampled B	ly: E & E	, Inc.	
Sample Type: Soil			Delivered	By: Feder	al Express	
E & E Lab. No. 86-	6004	6005	6006	6007	6008	
Customer No.	9033	9034	9035	9036	9037	
Sample Identity						
	Results i	in: mg/kg u	mless noted			
Oil and Grease	182	<100 90	152 94	<100 82	<100 87	
	70	, ,	,,	52	87	
:						

## Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst:

Date

H-120



## LABORATORY REPORT

FOR

## REESE AIR FORCE BASE

U-3818.2

Job No.: U-3818			RE:	DF-2000	
Sample Date: 7/31/8	6		P.O. No.:		
Date Received: 8/1/86			Sampled 8	By: E&E, Inc.	
; Sample Type: Soil		:	Delivered	By: Federal Express	
E & E Lab. No. 86-	6009	6010	6011		
Customer No.	9038	9039	9040		
Sample Identity		7			
	Results i	n: mg/kg u	nless noted		
Oil and Grease	<100 86	<100 80	<100 90		

## Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst:

Dates



## ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

## RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

U-3818.3

	E & E Lab. No. 86-	81 <i>a</i> nk	6004	6005	6006	6007
Compound	Sample Identity	8/5/86	9033	9034	9035	9036
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene		<250	<250	<250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250



## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E & E Lab. No. 86-	6008	6009	6010	6011	Blank
Compound	Semple Identity	9037	9038	9039	9040	8/5/86
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene		<250	<250	<250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250

## QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

		(ug	/ <b>kg</b> )	Relative
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
chlorobenzene	6011	<250	<250	
1,2-dichlarobenzene	6011	<500	<500	
1,3-dichlorobenzene	6011	<500	<500	
1,4-dichlorobenzene	6011	<500	<500	· 
benzene ·	6011	<250	<250	
total xylenes	6011	<500	<500	
toluene	6011	<250	<250	
ethyl benzene	6011	<b>&lt;250</b>	<250	



# RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg as received)

U-3818.6

	E & E Lab. No. 86-	81 ank	B1 ank	B1 ank	81 ank	6004	6005
Compound	Sample Identity	8/5/86	8/5/86	8/5/86	8/6/86	9033	9034
carbon tetrachloride		<250	<250	<250	<250	<250	<250
1,2-dichloroethane	1	<100	<100	<100	<100	<100	<100
1,1,1-trichloroethane		<250	<250	<250	<250	<250	<250
1,1-dichloroethane	[	<100	<100	<100	<100	<100	<100
1,1,2-trichloroethane	•	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloroet	hane	<250	<250	<250	<250	<250	<250
chloroethane		<500	<500	<500	<500	<500	<500
2-chloroethylvinyl et	her	<5000	<5000	<5000	<5000	<5000	<5000
chloroform	1	<250	<250	<250	<250	<250	<250
1,1-dichloroethene	į	<100	<100	<100	<100	<100	<100
trans-1,2-dichloroeth	ene (	<100	<100	<100	<100	<100	<100
1,2-dichloropropane		<1000	<1000	<1000	<1000	<1000	<1000
trans-1,3-dichloropro	pene	<1000	<1000	<1000	<1000	<1000	<1000
cis-1,3-dichloroprope	ne j	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride	1	<50	110	210	<50	<50	<50
chloromethane		<500	<500	<500	<500	<500	<500
bromomethane		<500	<500	<500	<500	<500	<500
bromoform	ł	<1000	<1000	<1000	<1000	<1000	<1000
bromodichloromethane	ĺ	<250	<250	<250	<250	<250	<250
fluorotrichloromethan	e	<500	<500	<500	<500	<500	<500
dichlorodifluorometha	ne	<500	<500	<500	<500	<500	<500
chlorodibromomethane	(	<250	<250	<250	<250	<250	<250
tetrachloroethene		<250	<250	<250	<250	<250	<250
trichloroethene	{	<250	<250	<250	<250	<250	<250
vinyl chloride		<500	<500	<500	<500	<500	<500

NOTE: Due to low level artifacts present in the methanol used for internal standard preparation and sample extraction, all samples have been blank subtracted. The actual value of the blank has been reported.

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

# RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg as received)

U-3818.7

	E&ELab. No.86-	6006	6007	6008	6009	6010	6011
Compound	Sample Identity	9035	9036	9037	9038	9039	9040
carbon tetrachloride		<250	<250	(250	<250	<250	<250
1,2-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,1-trichloroethane	,	<250	<250	<250	<250	<250	<250
1,1-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,2-trichloroethane	,	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachlorost	hane	<250	<250	<250	<250	<250	<250
chloroethane		<500	<500	<500	<500	<500	<500
2-chloroethylvinyl et	:her	<5000	<5000	<5000	<5000	<5000	<5000
chloroform		<250	<250	<250	<250	<250	<250
1,1-dichloroethene	ĺ	<100	<100	<100	<100	<100	<100
trans-1,2-dichloroeth	iene	<100	<100	<100	<100	<100	<100
1,2-dichloropropane		<1000	<1000	<1000	<1000	<1000	<1000
trans-1,3-dichloropro	pene	<1000	<1000	<1000	<1000	<1000	<1000
cis-1,3-dichloroprope	ne	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride		<50	<50	<50	<50	<50	<50
chloromethane		<500	<500	<500	<500	<500	<500
bromomethane		<500	<500	<500	<500	<500	<500
bromoform		<1000	<1000	<1000	<1000	<1000	<1000
bromodichloromethane		<250	<250	<250	<250	<250	<250
fluorotrichloromethan	ne	<500	<500	<500	<500	<500	<500
dichlorodifluorometha	ine	<500	<500	<500	<500	<500	<50 <b>0</b>
chlorodibromomethane		<250	<250	<250	<250	<250	<250
tetrachloroethene		<250	<250	<250	<250	<250	<250
trichloroethene		<250	<250	<250	<250	<250	<250
vinyl chloride		<500	<500	<500	<500	<50 <b>0</b>	<500

NOTE: Due to low level artifacts present in the methanol used for internal standard preparation and sample extraction, all samples have been blank subtracted. The actual value of the blank has been reported.



## QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

		(ug/	'kg)	Relative
Compound	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
carbon tetrachloride	6011	<250	<250	
1,2-dichloroethane	6011	<100	<100	
1,1,1-trichloroethane	6011	<250	<250	
1,1-dichlorsethane	6011	<100	<100	
1,1,2-trichloroethane	6011	<500	<500	
1,1,2,2-tetrachloroethane	6011	<250	<250	
chloroethane	6011	<500	<500	
2-chloroethylvinyl ether	6011	<5000	<5000	
chloroform	6011	<250	<250	
1,1-dichloroethene	6011	<100	<100	
trans-1,2-dichloroethene	6011	<100	<100	
1,2-dichloropropane	6011	<1000	<1000	
trans-1,3-dichloropropene	6011	<1000	<1000	
cis-1,3-dichloropropene	6011	<1000	<1000	
methylene chloride	6011	<50	<50	
chloromethane	6011	<500	<500	
bromomethane	6011	<500	<500	
bromoform	6011	<1000	<1000	
bromodichloromethane	6011	<250	<250	
fluorotrichloromethane	6011	<500	<500	
dichlorodifluoromethane	6011	<500	<500	
chlorodibromomethane	6011	<250	<250	
tetrachloroethene	6011	<250	<250	
trichloroethene	6011	<250	<250	
vinyl chloride	6011	<500	<500	





## LABORATORY REPORT

FOR

#### REESE AIR FORCE BASE

U-3818.9

Job No.: U-381	9		RE:		DF-200	10	
Sample Date: 7/31/	36		P.0	l. No.:			
Date Received: 8/1/8	6		Sam	pled By:	E&E,	Inc.	
Sample Type: Soil			Del	ivered By	: Federa	l Express	1
RESULTS OF CHEMIC	AL ANALYSI	S OF EXTR	ACTS FROM	EP TOXIC	ITY TESTS	& IGNITA	BILITY
	Maximum Allowable Concentration (mg/L)					Allowable Concen- tration	
E & E Lab. No. 86-	6012	6013	6014	Blank			
Customer No.	9164	9165	9166				
Sample Identity							
Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Endrin Lindane Methoxychlor Toxaphene 2,4-D 2,4,5-TP (Silvex) Ignitability, *F	<0.5 <5.0 <0.1 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 NR NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR			5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.02 0.4 10.0 0.5 10.0

NA: Not Applicable

NR: Analysis not requested.

## Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst:

Date:

H-128





# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

## RESULTS OF SOIL ANALYSES FOR PHENOLS BY GC

(all results in ug/g)

	E & E Lab. No. 86-	6004	6005	6006	6007	6008
	Sample Identity	9033	9034	9035	9036	9037
4-Chloro-3-Methylphenol	,	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chlorophenol		<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dichlorophenal		<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dimethylphenol		<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dinitrophenol		<1.0	<1.0	<1.0	<1.0	<1.0
2-Methyl-4,6-Dinitropheno	l [	<1.0	·<1.0	<1.0	<1.0	<1.0
2-Nitrophenol		<1.0	<1.0	<1.0	<1.0	<1.0
4-Nitrophenal		<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol		<1.0	<1.0	<1.0	<1.0	<1.0
Phenol		<1.0	<1.0	<1.0	<1.0	<1.0
2,4,6-Trichlorophenol		<1.0	<1.0	<1.0	<1.0	<1.0



## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

## RESULTS OF SOIL ANALYSES FOR PHENOLS BY GC

(all results in ug/g)

	E & E Lab. No. 86-	6009	6010	6011	81 ank	
	Sample Identity	9038	9039	9040	8/5/86	
4-Chloro-3-Methylphenol		<1.0	<1.0	<1.0	<1.0	
2-Chlorophenol		<1.0	<1.0	<1.0	<1.0	
2,4-Dichlorophenol		<1.0	<1.0	<1.0	<1.0	
2,4-Dimethylphenol		(1.0	<1.0	<1.0	<1.0	
2,4-Dinitrophenol		<1.0	<1.0	<1.0	<1.0	
2-Methyl-4,6-Dinitropher	nol	<1.0	<1.0	<1.0	<1.0	
2-Nitrophenol		<1.0	<1.0	<1.0	<1.0	
4-Nitrophenol		<1.0	<1.0	<1.0	<1.0	
Pentachlorophenol		<1.0	<1.0	<1.0	<1.0	
Phenol		<1.0	<1.0	<1.0	<1.0	
2,4,6-Trichlorophenol		<1.0	<1.0	<1.0	<1.0	

# QUALITY CONTROL FOR SPIKED SAMPLES OF SOIL ANALYSIS

			ıg/g		
Compound	E & E Lab. No. 86-	Original Analysis	Amt. Spiked	Amt. Deter.	Percent Recovery
phenal		<1.0	20	12	60
2-chlorophenol		<1.0	20	12	60
2-nitrophenol		<1.0	20	9	45
2,4-dimethylphenol		<1.0	20	14	70
2,4-dichlorophenol		<1.0	20	13	65
4-chloro-3-methylphenol	i	<1.0	20	18	90
2,4,6-trichlorophenol		<1.0	20	16	80
2,4-dinitrophenal		<1.0	20	13	65
4-nitrophenol		<1.0	20	14	70
4,6-dinitro-2-methylphenol		<1.0	20	16	80
pentachlorophenol		<1.0	20	14	70

# QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF E.P. TOXICITY TESTS

		(	ppm)	Relative
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Arsenic	6012	<0.5	<0.5	
Barium	6012	<5.0	<5.0	
Cadmium	6012	<0.1	<0.1	
Chromium	6012	<0.5	<0.5	
Lead	6012	<0.5	<0.5	
Mercury	6012	<0.0008	<0.0008	
Selenium	6012	<0.5	<0.5	
Silver	6012	<0.5	<0.5	
Solids, %	6008	87	86	1.2
Flashpoint, °F	6173*	>140	>140	

<sup>\*</sup>This represents 10% QC. This is not one of your samples but was analyzed in the same batch as your samples.

# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined	Percent
Parameter	Laboratory No. 86-	(	(mg/kg)		
0:1 and Grease	6011	<100	4290	5020	117
1					
			]		

# SAMPLE IDENTIFICATION CROSS-REFERENCE

	<del></del>	
Laboratory Number 86-	Field Number	Field Location
6426	9029	0165-NP-002-GN-86-9029
6427	9030	0165-NP-002-GN-86-9030

U-3879

SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

			ν. m		
	Analysis	Anal	8/18		
/E+30)	Anal	Dead	9/11		
Phenola(7/E+30)	tion	Extr	8/12		
Æ	Extraction	Dead	8/14		
	818	Anal	8/14		·
7/5+14	Analysis	Dead	8/21		•
Organophos(7/5+14)	ction	Extr	8/11		
<u> </u>	Extraction	Dead	8/14		
	Analysis	Anal	8/18		
Pest/PC8(7/E+40)	Anal	Dead	9/20		
at/PCB(	Extraction	Extr	8/11		
&	Extra	Dead	8/14		
	Analysis	Anal	8/13		
/E+30)	Anal	Dead	9/10 9/10		
Herb(7/E+	Extraction	Extr	8/11		
	Extra	Dead	8/14 8/14		
	14)	Anal	8/11,12 8/11,12		N01110N
	V0A(14)	Dead	8/21		VOA CONF IRMA I I ON DA I E 26 8/15 27 8/15
	9	Date	8/7		6426 6427
	01000	Number	6426		
	 ر ام	gor	3879	н-135	

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time expires.
Holding time based on sample date.
Holding time based on sample extraction. DEAD: EXTR: ANAL: ( ): S+#: E+#:

SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3879.2

Anal Pet. HC(28) 11 Dead 11 Anal 0&G(28) Dead 9/4 9/4 8/13 8/13 Anal TDS (7) Dead 8/14 8/13 8/13 Anal Analysis Dead 9/21 9/21 BNA(7/E + 40) Extr 8/12 8/12 Extraction Dead 8/14 8/14 Anal 11 Analysis PAH (7/5 + 30) Dead 11 Extr Extraction 11 Dead 11 Sample Date 8/7 8/7 Semple Number 6426 6427 3879 ą

Date sample holding time expires.

Date sample was extracted.

Date sample was analyzed.

Holding time.

Holding time expiration based on sample date.

Holding time expiration based on extraction date. DEAD: EXTR: ANAL: ( ): S+#: E+#:

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

# RESULTS OF WATER ANALYSIS FOR PURGEABLE HALDCARBON COMPOUNDS BY GC (all results in ug/L)

	E & E Lab. No. 86-	Blank	6426	6427			
Compound	Sample Identity	8/21/86	9029	9030			
carbon tetrachloride		<0.12	<0.12	<0.12			
1,2-dichloroethane		<0.03	<0.03	<0.03			(
1,1,1-trichloroethane		<0.03	<0.03	<0.03			
1,1-dichloroethane		<0.07	<0.07	<0.07			i
1,1,2-trichloroethane		<0.02	<0.02	<0.02			ĺ
1,1,2,2-tetrachloroet	hane	<0.03	<0.03	<0.03	ĺ		1
chloroethane		<0.52	<0.52	<b>&lt;0.52</b>	1		i
2-chloroethylvinyl et	her	<0.13	<0.13	<0.13	[		İ
chloroform		<0.05	<0.05	<0.05	[		<b>{</b>
1,1-dichloroethene		<0.13	<0.13	<0.13	1		ĺ
trans-1,2-dichloroeth	iene	<0.10	<0.10	<0.10	ŀ	j	İ
1,2-dichloropropane		<0.04	<0.04	<0.04	İ		1
trans-1,3-dichloropro	pene	<0.34	<0.34	<0.34	ĺ	<b>[</b>	i
cis-1,3-dichloroprope	ene	<0.20	<0.20	<0.20	ĺ		ĺ
methylene chloride		<0.25	<0.25	<0.25	1		ŀ
chloromethane		<0.08	<0.08	<0.08	ł		
bromomethane		<1.18	<1.18	<1.18	ĺ		
bromoform		<0.20	<0.20	<0.20			•
bromodichloromethane		<0.10	<0.10	<0.10	ļ		ĺ
fluorotrichloromethan	ne	<2.0	<2.0	<2.0			ĺ
dichlorodifluorometha	ine	<1.81	<1.81	<1.81			ł
chlorodibromomethane	•	<0.09	<0.09	<0.09			
tetrachloroethene		<0.03	<0.03	<0.03			
trichloruelhen <b>e</b>		<0.12	<0.12	<0.12			
vinyl chloride		<0.18	<0.18	<0.18			

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

## RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/L)

Compound	E & E Lab. No. 86- Sample Identity	6426 9029	6427 9030	Method Blank		
	·			ļ	ļ	
bis(2-chloroethyl)ether		<10	<10	<10		Į.
1,3-dichlorobenzene		<10	<10	<10	}	
1,4-dichlorobenzene		<10	<10	<10	i	1
1,2-dichlorobenzene		<10	<10	<10	1	
bis(2-chloroisapropyl)ether		<10	<10	<10	ł	(
N-nitrosodipropylamine		<10	<10	<10		l
hexachloroethane		<10	<10	<10	1	}
nitrobenzene		<10	<10	<10		[
isophorone		<10	<10	<10	ļ	1
bis(2-chloroethoxy)methane		<10	<10	<10	į	
1,2,4-trichlorobenzene		<10	<10	<10	ļ	
naphthalene		<10	<10	<10	]	[
hexachlorobutadiene		<10	<10	<10	1	1
hexachlorocyclopentadiene		<10	<10	<10		]
2-chloronaphthalene		<10	<10	<10		ľ
dimethyl phthalate		<10	<10	<10		}
acenaphthylene		<10	<10	<10	į	ţ
fluorene		<10	<10	<10	1	}
acenaphthene		<10	<10	<10	İ	ľ
2,4~dinitrotoluene		<10	<10	<10	i	
2,6-dinitrotoluene		<10	<10	<10		[
diethylphthølate		<10	<10	<10		<u>}</u>
4-chlorophenyl phenyl ether		<10	<10	<10	1	[
N-nitrosodiphenylamine		<10	<10	<10		
4-bromophenyl phenyl ether		<10	<10	<10	Į.	Í
hexachlorobenzene		<10	<10	<10		
phenanthrene		<10	<10	<10	1	1
anthracene		<10	<10	<10	1	
di-n-butyl phthalate		<10	<10	<10	[	{
fluoranthene		<10	<10	<10	ļ	
benzidin <b>e</b>		<50	<50	<50		j
pyrene		<10	<10	<10	Ì	}
butyl benzyl phthalate		<10	<10	<10		<b> </b>
3,3'-dichlorobenzidine		<30	<30	<30	[	j
benzo(a)anthracene		<10	<10	<10		
bis(2-ethylhexyl)phthalate		<10	<10	<10	1	
chrysene		<10	<10	<10	{	
di-n-octyl phthalate		<10	<10	<10	I	
benzo(b)fluoranthene		<10	<10	<10	Ī	ĺ
benzo(k)fluoranthene		<10	<10	<10	[	
benzo(a)pyrene		<10	<10	<10	<u> </u>	
indeno(1,2,3-cd)pyrene		<10	<10	<10	1	
dibenzo(a,h)anthracene		<10	<10	<10	l	1
benzo(ghi)peryløne		<10	<10	<10	1	

<sup>\*</sup>Compound present below measurable detection limit.



## QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

	E & E	(u	g/L)	Relative
Compound	Laboratory No. 86- 6427	Original Analysis	Replicate Analysis	Percent Difference (RPD)
carbon tetrachloride		<0.12	<0.12	
1,2-dichloroethane		<0.03	<0.03	
1,1,1-trichloroethane	<b>[</b>	<0.03	<0.03	
1,1-dichloroethane	[	<0.07	<0.07	
1,1,2-trichloroethane	(	<0.02	<0.02	
1,1,2,2-tetrachloroethane	[	<0.03	<0.03	
chloroethane	ĺ	<0.52	<0.52	
2-chloroethylvinyl ether	[	<0.13	<0.13	
chloroform		<0.05	<0.05	
1,1-dichloroethene		<0.13	<0.13	
trans-1,2-dichloroethene	Į.	<0.10	<0.10	
1,2-dichloropropane	ŀ	<0.04	<0.04	
trans-1,3-dichloropropene	ł	<0.34	<0.34	
cis-1,3-dichloropropene		<0.20	<0.20	- <del>-</del>
methylene chloride	İ	<0.25	<0.25	
chloromethane	<b>\</b>	<0.08	<0.08	
bromomethane		<1.18	<1.18	
bromoform		<0.20	<0.20	
bromodichloromethane		<0.10	<0.10	[
fluorotrichloromethane		<2.0	<2.0	
dichlorodifluoromethane	1	<1.81	<1.81	
chlorodibromomethane	1	<0.09	<0.09	
tetrachloroethene		<0.03	<0.03	
trichloroethene		<0.12	<0.12	
vinyl chloride	1	<0.18	<0.18	



	E&E	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86-		(ug/L)		Percent Recovery
2,4-D	DI Spike	<0.50	10.0	7.5	75
Silvex (2,4,5-TP)	DI Spike	<0.05	10.0	6.4	64
			į		

## ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

# RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT PESTICIDES, PCBs, AND HERBICIDES BY CC

(all results in ug/L)

U-3879.9

	E & E Lab. No. 86-	Blank	6426*	6427				
Compound	Sample Identity	8/11/86	9029	90 30				
Aldrin		<0.05	<0.25	<0.05				
a-BHC		<0.05	<0.25	<0.05				
b-BHC		<0.05	<0.25	<0.05	:	ŀ	ļ	İ
g-8HC		<0.05	<0.25	<0.05	ļ	}	ļ	
d-BHC		<0.05	<0.25	<0.05		j		
Chlordane		<0.50	<2.5	<0.50				
4,4'-DDD		<0.10	<0.50	<0.10	İ	ļ		
4,4'-DDE		<0.10	<0.50	<0.10				
4,4'-DOT		<0.10	<0.50	<0.10		1		
Dieldrin		<0.10	<0.50	<0.10	) 	Ì	Ì	[
Endosulfan I		<0.05	<0.25	<0.05	1	-		
Endosulfan II		<0.10	<0.50	<0.10	1	}		
Endosulfan sulfate		<0.10	<0.50	<0.10		Ì	i	
Endrin		<0.10	<0.50	<0.10		1		
Endrin aldehyde		<0.10	<0.50	<0.10	l	1	)	
Heptachlor		<0.05	<0.25	<0.05	İ			
Heptachlor epoxide		<0.05	<0.25	<0.05	ĺ			
PCB - 1016		<0.50	<2.5	<0.50	}	i		
PCB - 1221		<0.50	<2.5	<0.50	ł	}		
PCB - 1232		<0.50	<2.5	<0.50		l	İ	
PCB - 1242		<0.50	<2.5	<0.50	[	1	i	
PCB - 1248		<0.50	<2.5	<0.50		1		
PCB - 1254		<1.0	<5.0	<1.0		Ì		
PCB - 1260		<1.0	<5.0	<1.0				
Toxaphene		<1.0	<5.0	<1.0		1	1	
2,4-D		<0.50	<0.50	<0.50	!	]	1	
2,4,5-TP (Silvex)		<0.05	<0.05	<0.05		ł	1	
2,4,5-1		<0.05	<0.05	<0.05			ļ	
								:

⊯Elevated detection limits due to matrix interferences.

## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY OF SURROGATE SPIKES

U-3879.10

	E&E	Amount Added	Amount Determined		
Compound	Laboratory No. 86-	(	ug/L)	Percent Recovery	
nitrobenzene-05	6426	100	45	45	
	6427	100	52	52	
2-fluorobiphenyl	6426	100	48	48	
	6427	100	51	51	
terphenyl-D14	6426	100	44	44	
	6427	100	50	50	
phenol-D5	6426	200	82	41	
	6427	200	90	45	
2-fluorophenol	6426	200	71	35.5	
	6 427	200	90	45	
2,4,6-tribromophenol	6426	200	68	34	
	6427	200	79	39.5	

These recoveries are acceptable to EPA Contract Lab Program (CLP) guidelines.

## QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

		(u	Relative	
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Aldrin	6426	<0.25	<0.25	
a-BHC	6426	<0.25	<0.25	
b-BHC	6426	<0.25	<0.25	
g-BHC	6426	<0.25	<0.25	[
d-BHC	6426	<0.25	<0.25	[
Chlordane	6426	<2.5	<2.5	i
4,4'-DDD	6426	<0.50	<0.50	
4,41-DDE	6426	<0.50	<0.50	
4,4'-DDT	6426	<0.50	<0.50	
Dieldrin	6426	<0.50	<0.50	<b>}</b>
Endosulfan I	6426	<0.25	<0.25	
Endosulfan II	6426	<0.50	<0.50	
Endosulfan sulfate	6426	<0.50	<0.50	
Endrin	6426	<0.50	<0.50	
Endrin aldehyde	6426	<0.50	<0.50	
Heptachlor	6426	<0.25	<0.25	
Heptachlor epoxide	6426	<0.25	<0.25	
PCB - 1016	6426	<2.5	<2.5	
PCB - 1221	6426	<2.5	<2.5	(
PCB - 1232	6426	<2.5	<2.5	
PCB - 1242	6426	<2.5	<2.5	
PCB - 1248	6426	<2.5	<2.5	
PCB - 1254	6426	<5.0	<5.0	
PCB - 1260	6426	<5.0	<5.0	
Toxaphene	6426	<5.0	<5.0	

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

# RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/L)

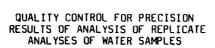
E & E Lab. No. 86-		Blank	6426*	6427*	
Compound	Sample Identity	8/11/86	9029	9030	
chlarabenzene		<0.20	<0.20	<0.20	
1,2-dichlorobenzene	1,2-dichlorobenzene		<0.40	<0.40	
1,3-dichlorobenzene		<0.40	<0.40	<0.40	
1,4-dichlorobenzene		<0.30	<0.30	1.1	
benzene		<0.20	<0.20	<0.20	
total xylenes		<1.0	<1.0	<1.0	
toluene		<0.20	1.5	<0.20	
ethy lbenzen <b>e</b>		<0.20	<0.20	<0.20	

<sup>\*</sup>Sample confirmed - results positive



# QUALITY CONTROL FOR ACCURACY: PERCENT DIFFERENCE--EPA QUALITY ASSURANCE MATERIALS

	Concentrat		
Parameter	Known	Determined	Percent Difference
Cadmium	940	892	5.1
Chromium	1030	970	5.8
Copper	1030	969	5.9
Lead	53	49.9	5.8
Nickel	1020	971	4.8
Zinc	1010	934	7.5
Oil and Grease	22,650	20,300	10.4



		(п	(mg/L)		
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)	
Total Dissolved Solids	6426	300	280	6.9	
Cadmium	6427	<0.005	<0.005		
Chromium	6427	<0.05	<0.05	~-	
Copper	6427	<0.02	<0.02	~-	
Lead	6427	<0.005	<0.005		
Nickel	6427	<0.1	<0.1		
Zinc	6427	<0.05	<0.05	~~	

# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

## RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY QC/MS

(all results in ug/L)

	E & E Lab. No. 86-	6426	6427	Method Blank		
Compound	Sample Identity	9029	9030			
phenal		<10	<10	<10		
2-chlorophenol		<10	<10	<10		(
2-nitrophenol		<10	<10	<10	Í	(
2,4-dimethylphenol		<10	<10	<10		}
2,4-dichlorophenol		<10	<10	<10	<b>(</b>	J
4-chloro-3-methylphenol		<10	<10	<10	<b>!</b>	ļ
2,4,6-trichlorophenol		<10	<10	<10	1	}
2,4-dinitrophenol		<30	<30	<30	İ	
4-nitrophenol		<10	<10	<10	1	j
4,6-dinitro-2-methylphenol		<30	<30	<30	1	
pentachlorophenol		<30	<30	<30		
	·····					

<sup>\*</sup>Compound present below measurable detection limit



## LABORATORY REPORT

FOR

## REESE AIR FORCE BASE

U-3879.16

Job No.: U-3879	,		RE:	DF-2000
Sample Date: 8/7/86			P.O. No.:	
Date Received: 8/8/86	· · · · · · · · · · · · · · · · · · ·		Sampled B	ly: E & E, Inc.
Sample Type: Water			Delivered	By: Federal Express
E & E Lab. No. 86-	6426	6427	Blank	
Customer No.	9029	9030		
Sample Identity				
	Results i	n: mg/L ur	less noted	
Total Dissolved Solids Oil and Grease Cadmium Chromium Copper Lead Nickel Zinc	300 2.1 <0.005 <0.05 <0.02 0.007 <0.1 <0.05	360 1.3 <0.005 <0.05 <0.02 <0.005 <0.1 <0.05	NA NA <0.005 <0.05 <0.02 <0.005 <0.1 <0.05	

NA: Not Applicable

Analytical References:

"Methods for the Chemical Analysis of Water and Wastes," EPA-600/4-79-020, March 1983.

Supervising Analyst: Medical Angles

Date: School for file of the



# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

# RESULTS OF WATER ANALYSIS FOR ORGANOPHOSPHOROUS PESTICIDES BY GC

(all results in ug/L)

	E & E Lab. No. 86-	Blank	6426	6427				
Compound	Sample Identity	8/11/86	9029	9030				
Naled		<0.10	<0.10	<0.10				
Phorate		<0.15	<0.15	<0.15				
Disulfoton		<0.20	<0.20	<0.20	:			
Chlorpyrifos		<0.30	<0.30	<0.30				
Dimethoate		<0.30	<0.30	<0.30				
Malathion		<0.30	<0.30	<0.30	 	]	}	
Mevinphos		<0.30	<0.30	<0.30				
Parathion		<0.30	<0.30	<0.30				
Methyl parathion		<0.30	<0.30	<0.30	]			
Diazinon		<0.60	<0.60	<0.60				
Methyl azinphos		<1.5	<1.5	<1.5				
							<u></u>	



## QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

		(u	Relative	
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Naled	6426	<0.10	<0.10	
Phorate	6426	<0.15	<0.15	
Disulfoton	6426	<0.20	<0.20	
Chlorpyrifos	6426	<0.30	<0.30	
Dimethoate	6426	<0.30	<0.30	
Malathion	6426	<0.30	<0.30	
Mevinphos	6426	<0.30	<0.30	
Parathion	6426	<0.30	<0.30	
Methyl parathion	6426	<0.30	<0.30	
Diazinon	6426	<0.60	<0.60	
Methyl azinphos	6426	<1.5	<1.5	



# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED WATER SAMPLES

	E & E Laboratory	Original Value	Amount Added	Amount Determined	
Parameter	Na. 86- Di Spike	(	ug/L)		Percent Recovery
4-chloro-3-methylphenol 2-chlorophenol 2,4-dichlorophenol 2,4-dimethylphenol 2-methyl-4,6- dinitrophenol 2-nitrophenol pentachlorophenol phenol 2,4,6-trichlorophenol		<0.36 <0.31 <0.39 <0.32 <16 <0.45 <7.4 <0.14 <0.64	40.0 40.0 40.0 40.0 40.0 40.0 40.0 40.0	24.2 37.7 36.4 28.4 47.2 35.0 26.4 37.7 38.4	60.5 94.3 91.0 71.1 118 87.5 65.9 94.3 95.9

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

## RESULTS OF WATER ANALYSIS FOR PHENOLS BY GC

(all results in ug/L)

U-3879.20

	E & E Lab. No. 86-	Blank	6426 *	6427 *		
Compound	Sample Identity	8/12/86	9029	9030		
phenol	•	<0.14	<5 <b>.</b> 0	<5.0		
2-chlorophenol		<0.31	<5.0	<5.0	•	ľ
2-nitrophenol		<0.45	<5.0	<5.0	1	ĺ
2,4-dimethylphenol		<0.32	<5.0	<5.0	Ì	ł
2,4-dichlorophenol		<0.39	<5.0	<5.0		
4-chloro-3-methylphenol		<0.36	<5.0	<5.0	1	1
2,4,6-trichlorophenol		<0.64	<5.0	<5.0		
2,4-dinitrophenol		<13.0	<13.0	<13.0	1	[
4-nitrophenol		<2.8	<5.ñ	<5.0	<b>[</b>	
pentechlorophenol 2-methyl-4,6-dinitrophenol		<7.4 <16.0	<7.4 <16.0	<7.4 <16.0		

<sup>\*</sup> Elevated detection limits due to matrix interferences.

## SAMPLE IDENTIFICATION CROSS-REFERENCE

U-3930

Laboratory Number 86-	Field Number	Field Location
7022	9042	0165-S0-002-GS-86-9042
7023	9043	0165-S0-002-GS-86-9043
7024	9183	0165-S0-002-GS-86-9183
,		

SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

<del></del>		-	
	ysis	Anal	8/20 8/20
(E+30)	Analysis	Dead	9/17
Phenols(7/E+30)	tion	Extr	8/18 8/18
륍	Extraction	Dead	8/20
7	yeis	Ana1	
(7/5+14	Analysis	Dead	
Organophos(7/S+14)	Extraction	Extr	
50	Extra	Dead	
	Analysis	Anal	
7/E+40)	Anel	Dead	
Pest/PCB(7/E+40)	Extraction	Extr	11
<u> </u>	Extra	Dead	! !
	Analysis	Anal	11
Herb(7/E+30)	Anal	Dead	
Herb(7	Extraction	Extr	11
	Extre	Dead	1 1
	V0A(14)	Anel	8/15, 19
	VOA.	Dead	8/27
	Sample	Date	8/13
	Semple	Number	7022
	goç.		U. 154

H-154

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time expires.
Holding time based on sample date.
Holding time based on sample extraction. DEAD: EXTR: ANAL: ( ): S+P: E+P:

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SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3930.13 Pet. HC(28) Anal 1 1 Dead 1 1 Anal 9/5 9/5 0&G(28) Dead Anal 1 1 105 (7) Dead 11 Anal 11 Analysis Dead BNA(7/E + 40) 1 1 Extr Extraction 1 1 Dead 1 1 Anal 1 1 Analysis PAH (7/5 + 30) Dead 1 1 Extr Extraction 11 Dead 11 Sample Date 8/13 8/13 Sample 7022 7023

DEAD:
EVTR:
ANAL:
( ):
S+#:
E+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time.
Holding time expiration based on sample date.
Holding time expiration based on extraction date.

H-155

3930

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FOR

#### REESE AIR FORCE BASE

U-3930.1

Job No.: U-3930	]		RE:	DF -200	าก	
Sample Date: 8/13/8	16		P.O. No.:			
Date Received: 8/14/8	16		Sampled B	ly: Ε&Ε,	Inc.	
Sample Type: Soil			Delivered	By: Federa	al Express	
E & E Lab. No. 86-	7022	7023				
Customer No.	9042	9043				
Sample Identity						
	Results i	n: mg/kg,	as received	unless note	ed	
Oil and Grease Solids, %	<100 84	160 79				

#### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst:

Date

4 20, 1981



RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg, as received)

U-3930.2

	E & E Lab. No. 86-	Blank	7022	7023			
Compound	Sample Identity	8/19/86	9042	9043			
carbon tetrachloride		<250	<250	<250			
1,2-dichloroethane		<100	<100	<100			İ
1,1,1-trichloroethane		<250	<250	<250			
1,1-dichloroethane		<100	<100	<100	i		ĺ
1,1,2-trichloroethane		<500	<500	<500		i	ĺ
1,1,2,2-tetrachloroet	hane	<250	<250	<250		i	[
chloroethane		<500	<500	<500			ĺ
2-chloroethylvinyl et	her	<5000	<5000	<5000			İ
chloroform		<250	<250	<250			1
1,1-dichloroethene		<100	<100	<100			{
trans-1,2-dichloroeth	ene	<100	<100	<100			ł
1,2-dichloropropane		<1000	<1000	<1000			
trans-1,3-dichloropro	pene	<1000	<1000	<1000			
cis-1,3-dichloroprope	ne	<1000	<1000	<1000			ĺ
methylene chloride		1,100	<50	<50			1
chloromethane	·	<500	<500	<500			ĺ
bromomethane		<500	<500	<500			ĺ
bromoform		<1000	<1000	<1000			•
bromodichloromethane		<250	<250	<250			ļ
fluorotrichloromethan	e	<500	<500	<500			İ
dichlorodifluorometha	ne	<500	<500	<500			
chlorodibromomethane		<250	<250	<250			
tetrachloroethene		<250	<250	<250			[
trichloroethene		<250	<250	<250			[
vinyl chloride		<500	<500	<500			

NOTE: Due to low level artifacts present in the methanol used for internal standard preparation and sample extraction, all samples have been blank subtracted. The actual value of the blank has been reported.

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

## RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

U-3930.3

	E & E Lab. No. 86-	Blank	7022	7023		
Compound	Sample Identity	8/15/86	9042	9043		
chlorobenzene		<250	<250	<250	-	
1,2-dichlorobenzene		<500	<500	<500		
1,3-dichlorobenzene		<500	<500	<500		
1,4-dichlorobenzene		<500	<500	<500		
benzene		<250	<250	<250		
total xylenes		<500	<500	<500		
toluene	·	<250	<250	<250	:	
ethylbenzene		<250	<250	<250	<u>.</u>	

## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

U-3930.4

	E&E	Original Value	Amount Added	Amount Determined	
Compound	Laboratory No. 86-		(ug/kg)		Percent Recovery
1,2-dichlorobenzene	7023	<500	1250	1136	91
1,3-dichlorobenzene	7023	<500	1250	1151	92
1,4-dichlorobenzene	7023	<500	1250	1144	92
toluene	7023	<250	1250	1176	94
ethyl benzene	7023	<250	1250	1150	92
		-			

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

U-3930,5

		(ug	Relative	
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
chlorobenzene	7023	<250	<250	
1,2-dichlorobenzene	7023	<500	<500	
1,3-dichlorobenzene	7023	<500	<500	
1,4-dichlorobenzene	7023	<500	<500	
benzene	7023	<250	<250	
total xylenes	7023	<500	<500	
toluene	7023	<250	<250	
ethyl benzene	7023	<250	<250	



FOR

#### REESE AIR FORCE BASE

U-3930.6

Job No.: U-393	80		RE:		DF-200	0	
Sample Date: 8/13/86				No.:			
Date Received: 8/14/	/86		Semp	oled By:	ξ&Ε,	Inc.	
Sample Type: Soil			Deli	vered By	: Federa	ıl Express	· · · · · · · · · · · · · · · · · · ·
RESULTS OF CHEMICA	AL ANALYSIS	OF EXTRACTS	FROM E	P TOXICI	TY TESTS	AND IGNIT	ABILITY
		mg/L					
E&E Lab. No. 86-	7024	Blank					
Customer No.	9183						
Sample Identity							
Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Endrin Lindane Methoxychlor Toxaphene 2,4-D 2,4,5-TP (Silvex) Ignitability, °F	<0.5 <5 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR	<0.5 <5 <0.1 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR					5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.02 0.4 10.0 0.5

Not Requested Not Applicable NR:

#### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Juy

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

## RESULTS OF SOIL ANALYSIS FOR PHENOLS BY GC

(all results in ug/g, as received)

U-3930.7

	E & E Lab. No. 86-	Blank	7022	7023		
Compound	Sample Identity	8/18/86	9042	9043		
phenol		<1.0	<1.0	<1.0		
2-colorophenol		<1.0	<1.0	<1.0	(	(
2-nitraphenol	ł	<1.0	<1.0	<1.0	{	
2,4-dimethylphenol		<1.0	<1.0	<1.0		•
2,4-dichlorophenol	i	<1.0	<1.0	<1.0		1
4-chloro-3-methylphenol	i	<1.0	<1.0	<1.0	1	ſ
2,4,6-trichlorophenol	!	<1.0	<1.0	<1.0	<b>{</b>	
2,4-dinitrophenol	- 1	<1.0	<1.0	<1.0		[
4-nitrophenol		<1.0	<1.0	<1.0	[	
4,6-dinitro-2-methylphenol		<1.0	<1.0	<1.0	Į.	
pentachlorophenol		<1.0	<1.0	<1.0	[	

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

U-3930.8

		(u	ıg/g)	Relative
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
phenol 2-chlorophenol 2-nitrophenol 2,4-dimethylphenol 2,4-dichlorophenol 4-chloro-3-methylphenol 2,4,6-trichlorophenol 2,4-dinitrophenol 4-nitrophenol 4,6-dinitro-2-methylphenol pentachlorophenol	7022 7022 7022 7022 7022 7022 7022 7022	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	      

## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

U-3930.9

	E&E	Original Value	Amount Added	Amount Determined	
Perameter	Laboratory No. 86-		(mg/kg)		Percent Recovery
Oil and Grease	7023	160	4530	5400	119
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	•				
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		l			

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#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

U-3930.10

Parameter	E&E Laboratory No. 86-	Original Analysis	Replicate Analysis	Relative Percent Difference (RPD)
Flashpoint, °F	7024	>140	>140	
Solids, %	7094*	96	96	o

<sup>\*</sup>This represents 10% QC. This is not one of your samples but was analyzed in the same batch.

## QUALITY CONTROL FOR ACCURACY: PERCENT DIFFERENCE--EPA QUALITY ASSURANCE MATERIALS

U-3930.11

	Concentra		
Parameter	Known	Determined	Percent Difference
Arsenic	46.0	44.5	3,3
Barium	119,600	115,950	3.0
Cadmium	1300	1220	6.2
Chromium	6500	6220	4.6
Lead	8000	7000	12.5
Mercury	4.4	4.41	<0.5
Selenium	7.90	7.20	8.9
Silver	6000	6500	8.3
		ļ	
	!		



## SAMPLE IDENTIFICATION CROSS-REFERENCE

U-3838

<del></del>		
Laboratory Number 86-	Field Number	Field Location
6159	9061	0165-S0-003-GS-86-9061
6160	9062	0165-S0-003-GS-86-9062
6161	9063	0165-S0-003-GS-86-9063
6162	9064	0165-S0-083-GS-86-9064
6163	9065	0165-S0-003-GS-86-9065
6164	9066	0165-S0-003-GS-86-9066
6165	9067	0165-S0-003-GS-86-9067
6166	9068	0165-S0-003-GS-86-9068
6167	9069	0165-S0-003-GS-86-9069
6168	90 70	0165-S0-003-GS-86-9070
6169	9071	0165-50-003-GS-86-9071
61 70	9143	0165-S0-003-GS-86-9143

## SAMPLE IDENTIFICATION CROSS-REFERENCE

#### U-3838.1

Laboratory Number 86-	Field Number	Field Location
6171	9150	0165-S0-003-GS-86-9150
6172	9168	0165-S0-003-GS-86-9168
6173	9171	0165-S0-003-GS-86-9171
6174	9172	0165-S0-003-GS-86-9172
6175	9174	0165-S0-003-GS-86-9174

H-168

U-3838.18

# SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

Anal 11111111111111 Analysis Deed Phenols (7/E+30) Extraction 111111111111111 Dead 11111111111111 Anal 1111111111111 Analysis Organophoa(7/5+14) Dead 11111111111111 Extr Extraction Dead Anal 11111111111111 Analysis Pest/PCB(7/E+40) Dead 11111111111111 Extr Extraction Dead 11111111111111 Anel 11111111111111 Analysis Dead Herb(7/E+30) 1111111111111 Extr Extraction 11111111111111 Dead 11111111111111 8/6 8/6 8/6 8/6 8/6 7,2 8/6 1,1 8/7 1,1 8/7 1,1 Anal V0A(14) Dead 88,17 171,18 171,18 171,18 18,17 171,18 18,17 171,18 18,17 171,18 Sample Sample 6159 6160 6161 6162 6165 6165 6166 6167 6170 6171 3838 ф

H-169

Date sample holding time expires.

Date sample was extracted. Date sample was analyzed. DEAD: EXTR: ANAL:

Holding time expires. Holding time based on sample date. Holding time based on sample extraction.

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DEAD: EXTR: ANAL: ( ): S+#:

Date sample holding time expires.

Date sample was extracted.

Date sample was analyzed.

Holding time expiration based on sample date.

Holding time expiration based on extraction date.

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

## RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E&ELab. No.86-	6163	6164	6165	6166	6167
Compound	Sample Identity	9065	9066	9067	9068	9069
chlorob <i>e</i> nzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene	!	<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
b <i>e</i> nzene		<250	<b>&lt;250</b>	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene		<250	<250	<250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250

## ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

## RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E&ELab. No.86-	6168	6169	61 70	6171	BLANK
Compound	Sample Identity	90.70	9071	91 43	91 50	8/7/86
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene		<250	<250	<250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

		(ug	Relative	
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
chlorobenzene	6167	<250	<250	
1,2-dichlorobenzene	6167	<500	<500	-
1,3-dichlorobenzene	6167	<500	<500	
1,4-dichlorobenzene	6167	<500	<500	
benzene	6167	<250	<250	
total xylenes	6167	<500	<500	
toluene	6167	<250	<250	
ethyl benzene	6167	<250	<250	



FOR

#### REESE AIR FORCE BASE

U-3838.5

Job No.: U-3838	Job No.: U-3838				DF-200	າດ	
Sample Date: 8/3/86	<u> </u>		P.0	P.O. No.:			
Date Received: 8/5/86				pled By:	E&E,	Inc.	
Sample Type: Soil				ivered By	: Federa	l Express	3
RESULTS OF CHEMICAL ANALYSIS OF EXTRACTS FROM EP TOXICITY TESTS AND IGNITABILITY							ABILITY
	Max Allo Con tra mg/L (mg						
E & E Lab. No. 86-	6172	6173	6174	6175	BLANK		
Customer No.	9168	9171	9172	9174			
Sample Identity							
Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Endrin Lindane Methoxychlor Toxaphene 2,4-D 2,4,5-TP (Silvex) Ignitability, °F	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR	CO.5 CO.1 CO.5 CO.5 CO.0008 CO.5 NR NR NR NR NR NR NR		5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.02 0.4 10.0 0.5

NR: Analysis not requested

NA: Not Applicable

Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Jau

Date:

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

## RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E&ELab. No.86-	Blank	6159	6160	6161	6162
Compound	Sample Identity	8/6/86	9061	90.62	90.63	90.64
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
taluene		<250	<250	<250	<250	<250
ethylbenzene	<del></del>	<250	<250	<250	<250	<250



FOR

#### REESE AIR FORCE BASE

U-3838.7

Jab No.: U-3838			RE:	DF-20	00	
Sample Date: 8/3/86			P.O. No.:			
Date Received: 8/5/86			Sampled 8	y: E&E	, Inc.	
Sample Type: Soil			Delivered	By: Feder	al Express	
E & E Lab. No. 86-	6159	6160	6161	6162	6163	6164
Customer No.	9061	9062	9063	9064	9065	9066
Sample Identity						
	Results i	n: mg/kg @	s received			
Petroleum Hydrocarbons	<10	<10	<10	<10	<10	<10
Oil and Grease	<100	<100	122	<100	<100	197
Chromium	5.92	10.5	10.4	7.38	7.60	8.21
Lead	3.80	5.46	4.23	2.80	2.81	7.22
Solids, %	88	88	89	89	88	87

#### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst:

Date:

0,1980



FOR

#### REESE AIR FORCE BASE

U-3838.8

Job No.: U-3838			RE:	DF-20	00	
Sample Date: 8/3/86			P.O. No.:			
Date Received: 8/5/86			Sampled By	y: E&E	, Inc.	
Sample Type: Soil			Delivered	By: Feder	al Express	
E & E Lab. No. 86-	6165	6166	6167	6168	6169	6170
Customer No.	9067	9068	9069	9070	9071	9143
Sample Identity						
	Results i	n: mg/kg a	s received			
Petroleum Hydrocarbons Oil and Grease Chromium Lead Solids, %	<10 <100 8.01 4.00 89	<10 <100 6.83 2.84 87	<10 100 14.0 5.16 82	<10 <100 9.62 4.91 92	<10 <100 9.65 5.10 94	<10 <100 5.93 1.92 91

#### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Supplied 16 19 Aug



FOR

#### REESE AIR FORCE BASE

U-3838.9

Job No.: U-3838	3		RE:	DF-2000		
Sample Date: 8/3/86			P.O. No.:			
Date Received: 8/3/86	5		Sampled 8	y: E&E, Inc	•	
Sample Type: Soil			Delivered	By: Federal Ex	press	
E & E Lab. No. 86-	6171	Blank*				
Customer No.	9150					
Sample Identity						
	Results i	n: mg/kg e	s received			
Petroleum Hydrocarbons Oil and Grease Chromium Lead Solids, %	<10 <100 5.30 2.32 90	NA NA <0.05 <0.005 NA				

\*: mg/L

NA: Not Applicable

#### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

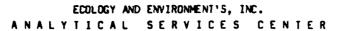
Supervising Analyst:

Date:

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

# RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg, as received)

	E & E Lah. No. 86-	Blank	Blank	6159	6160	6161	6162
Compound	Sample Identity	8/6/86	8/7/86	9061	9062	9063	9064
carbon tetrachloride		<250	<250	<250	<250	<250	<250
1,2-dichloroethane	ł	<100	<100	<100	<100	<100	<100
1,1,1-trichloroethan	e	<250	<250	<250	<250	<250	<250
1,1-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,2-trichloroethan	e	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloroe	thane	<250	<250	<250	<250	<250	<250
chloroethane	I	<500	<500	<500	<500	<500	<500
2-chloroethylvinyl e	ther	<5000	<5000	<5000	<5000	<5000	<5000
chloroform	ļ	<250	. <250	<250	<250	<250	<250
1,1-dichloroethene	ĺ	<100	<100	<100	<100	<100	<100
trans-1,2-dichloroet	hene	<100	<100	<100	<100	<100	<100
1,2-dichloropropane	Ĭ	<1000	<1000	<1000	<1000	<1000	<1000
trans-1,3-dichloropro	open <del>e</del>	<1000	<1000	<1000	<1000	<1000	<1000
cis-1,3-dichloroprop	en <b>e</b>	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride	ļ	<50	<50	<50	<50	<50	<50
chloromethane	1	<500	<500	<500	<500	<500	<500
bromomethane	1	<500	<500	<500	<500	<500	<500
bromoform	İ	<1000	<1000	<1000	<1000	<1000	<1000
bromodichloromethane	j	<250	<250	<250	<250	<250	<250
fluorotrichloromethane		<500	<500	<500	<500	<500	<500
dichlorodifluoromethane		<500	<500	<500	<500	<500	<500
chlorodibromomethane		<250	<250	<250	<250	<250	<250
tetrachloroethene		<250	<250	<250	<250	<250	<250
trichloroethene		<250	<250	<250	<250	<250	<250
vinyl chloride	İ	<500	<500	<500	<500	<500	<500



# RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg, as received)

	E & E Lab. No. 86-	6163	6164	6165	6166	6167	6168
Compound	Sample Identity	9065	9066	9067	9068	9069	9070
carbon tetrachloride		<250	<250	<250	<250	<250	<250
1,2-dichloroethane	j	<100	<10 <b>0</b>	<100	<100	<100	<100
1,1,1-trichloroethane	•	<250	<250	<250	<250	<250	<250
1,1-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,2-trichloroethand	•	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloroe	thane	<250	<250	<250	<250	<250	<250
chloroethane	[	<500	<500	<500	<500	<500	<500
2-chloroethylvinyl e	ther	<5000	<5000	<5000	<5000	<5000	<5000
chloroform	į	<250	<250	<250	<250	<250	<250
1,1-dichloroethene		<100	<100	<100	<100	<100	<100
trans-1,2-dichloroet	nene	<100	<100	<100	<100	<100	<100
1,2-dichloropropane	1	<1000	<1000	<1000	<1000	<1000	<1000
trans-1,3-dichloropro	pene	<1000	<1000	<1000	<1000	<1000	<1000
cis-1,3-dichloropropo	ene	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride		<50	<50	<50	<50	<50	<50
chloromethane	ļ	<500	<500	<500	<500	<500	<500
bromomethane		<500	<500	<500	<500	<500	<500
bromoform	Ĭ	<1000	<1000	<1000	<1000	<1000	<1000
bromodichloromethane	1	<250	<250	<250	<250	<250	<250
fluorotrichlorometha	ne	<500	<500	<500	<500	<500	<500
dichlorodifluorometh	ane	<500	<500	<500	<500	<500	<500
chlorodibromomethane	j	<250	<250	<250	<250	<250	<250
tetrachloroethene	į	<250	<250	<250	<250	<250	<b>&lt;250</b>
trichloroethene	i	<250	<250	<250	<250	<250	<250
vinyl chloride	ŀ	<500	<500	<500	<500	<500	<500

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

## RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg, as received)

	E & E Lab. No. 86-	6169	6170	6171			
Compound	Sample Identity	9071	9143	9150			
carbon tetrachloride		<250	<250	<250			
1,2-dichloroethane		<100	<100	<100		j	ł
1,1,1-trichloroethan	e	<250	<250	<250	<b>†</b>		
1,1-dichloroethane	ţ	<100	<100	<100	ĺ		1
1,1,2-trichloroethan	e	<500	<500	<500	i	1	
1,1,2,2-tetrachloroe	thane	<250	<250	<250			ĺ
chloroethane	·	<500	<500	<500		ĺ	1
2-chloroethylvinyl e	ther	<5000	<5000	<5000	[	į	Ì
chloroform		<250	<250	<250	[	ĺ	{
1,1-dichloroethene		<100	<100	<100		i	[
trans-1,2-dichloroet	hene	<100	<100	<100		ł	i
1,2-dichloropropane		<1000	<1000	<1000	{	ł	İ
trans-1,3-dichloropr	opene	<1000	<1000	<1000	İ	ĺ	İ
cis-1,3-dichloroprop	ene	<1000	<1000	<1000	1		1
methylene chloride		<50	<50	<50			ł
chloromethane		<500	<500	<500			ł
bromomethane		<500	<500	<500			1
bromoform		<1000	<1000	<1000			ĺ
bromodichloromethane		<250	<250	<250			
fluorotrichlorometha	ne	<500	<500	<500			İ
dichlorodifluorometh	ane	<500	<500	<500			ĺ
chlorodibromomethane		<250	<250	<250			
tetrachloroethene		<250	<250	<250	1		
trichloroethene	İ	<250	<250	<250	ĺ		
vinyl chloride	į	<500	<500	<500			ľ

## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined	
Compound	Laboratory No. 86-		(ug/kg)		Percent Recovery
carbon tetrachloride 1,2-dichloroethane 1,1,1-trichloroethane 1,1-dichloroethane chloroethane chloroform trans-1,2-dichloroethene methylene chloride chloromethane bromomethane bromodichloromethane trichloroethene	6171 6171 6171 6171 6171 6171 6171 6171	<250 <100 <250 <100 <500 <250 <100 <50 <500 <500 <1000 <250 <250	1250 1250 1250 1250 1250 1250 1250 1250	1159 1185 1120 1199 1161 1140 1115 1030 1146 1375 1058 959.1 1192	92.7 94.8 89.6 95.9 92.9 91.2 89.2 82.4 91.7 110 84.6 76.7 95.4

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

		(ug	(ug/kg)		
Compound	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)	
carbon tetrachloride	6171	<250	<250		
1,2-dichloroethane	6171	<100	<100		
1,1,1-trichloroethane	6171	<250	<250		
1,1-dichloroethane	6171	<100	<100		
1,1,2-trichloroethane	6171	<500	<500		
1,1,2,2-tetrachloroethane	6171	<250	<250		
chloroethane	6171	<500	<500		
2-chloroethylvinyl ether	6171	<5000	<5000		
chloroform	6171	<250	· <250		
1,1-dichlaraethene	6171	<100	<100		
trans-1,2-dichloroethene	6171	<100	<100		
1,2-dichloropropane	6171	<1000	<1000		
trans-1,3-dichloropropene	6171	<1000	<1000		
cis-1,3-dichloropropene	6171	<1000	<1000		
methylene chloride	6171	<50	<50		
chloromethane	6171	<500	<500		
bromomethane	6171	<500	<500		
bromoform	6171	<1000	<1000		
bromodichloromethane	6171	<250	<250		
fluoratrichloromethane	6171	<500	<500		
dichlorodifluoromethane	6171	<500	<500		
chlorodibromomethane	6171	<250	<250		
tetrachloroethene	6171	<250	<250		
trichloroethene	6171	<250	<250		
vinyl chloride	6171	<500	<500		

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF EP TOXICITY EXTRACTS

·		(п	g/L)	Relative
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Arsenic	6175	<0.5	<0.5	
Barium	6175	<5	<5	
Cadmium	6175	<0.1	<0.1	
Chromium	6175	<0.5	<0.5	
Lead	6175	<0.5	<0.5	
Mercury	6175	<0.0008	<0.0008	
Selenium	6175	<0.5	<0.5	
Silver	6175	<0.5	<0.5	
1				
<u> </u>	<u> </u>			

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

		(mg	1/kg)	Relative
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Petroleum Hydrocarbon	6170	<10	<b>&lt;</b> 10	
Solids	6061*	89	89	0
	6054*	91	91	0
Flashpoint	6173	>140	>140	
Chromium	6159	5.92	7.30	20.9
	6171	5.30	4.88	8.2
Lead	6159	3.80	3.54	7.1
	6171	2.32	1.89	20.4

<sup>\*</sup>This represents 10% QC. This is not one of your samples but was analyzed in the same batch as your samples.

## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined		
Parameter	Laboratory No. 86-		(mg/kg)			
Petroleum Hydrocarbon	6161	<10	2190	2520	115	
Oil and Grease	6160	<100	4280	4960	116	
		! 				

## SAMPLE IDENTIFICATION CROSS-REFERENCE

U-3854.3

<del></del>		<del>, ,</del>
Laboratory Number 86-	Field Number	Field Location
6227	9057	0165-S0-003-GS-86-9057
6228	9058	0165-S0-003-GS-86-9058
6229	9059	0165-S0-003-GS-86-9059
6230	9060	0165-50-003-GS-86-9060
6231	9084	0165-S0-004-GS-86-9084
6232	9085	0165-S0-004-GS-86-9085
6233	9086	0165-S0-004-GS-86-9086
6234	9093	0165-S0-007-GS-86-9093
6235	9094	0165-S0-007-GS-86-9094
6236	9095	0165-S0-007-GS-86-9095
6237	9096	0165-S0-007-GS-86-9096
6238	9097	0165-S0-007-GS-86-9097



# SAMPLE IDENTIFICATION CROSS-REFERENCE

Laboratory Number 86-	Field Number	Field Location
62 39	9098	0165-S0-007-GS-86-9098
6240	9099	0165-S0-007-GS-86-9099
6241	9100	0165-S0-007-GS-86-9100
6242	9101	0165-S0-007-GS-86-9101
6243	9102	0165-S0-007-GS-86-9102
6244	9103	0165-S0-007-GS-86-9103
6245	9104	0165-S0-007-GS-86-9104
6246	9138	0165-S0-007-GS-86-9138
6247	9173	0165-S0-003-GS-96-9173
6248	91 74	0165-S0-004-GS-86-9174
6249	91 75	0165-S0-007-GS-86-9175
6250	91 76	0165-S0-007-GS-86-9176





# SAMPLE IDENTIFICATION CROSS-REFERENCE

Laboratory Number 86-	Field Number	Field Location
6251	9177	0165-S0-007-GS-86-9177
6252	9178	0165-S0-007-GS-86-9178
6253	9179	0165-S0-007-GS-86-9179



	*			PAH (7/5 + 30)	5 + 30)	<del></del>	,	BNA(7/E + 40)	+ 40)	<del></del>		<del></del>				
4	o Como S		Extra	action	Anal	Analysis	Extra	Extraction	Analysis	vsis	10S	TDS (7)	086	0&G(28)	Pet.	Pet. HC(28)
200	Number	Date	Dead	Extr	Dead	Anal	Dead	Extr	Dead	Anal	Dead	Anal	Dead	Anal	Dead	Anal
1854	6227	8/3	;	ł	1	ł	:	:	:	:	:	:	8/31	8/14	8/31	.6/6
	6228	8/3	!	<u>'</u>	;		 	1	1	1	;	-	8/31	8/14	8/31	9/2*
	6229	8/3	ł		<b>!</b>	i	1	:	1	;	;	1	8/31	8/14	8/31	9/2*
	6230	8/3	ł	1	1	;	1	;	;	:	!	1	8/31	8/14	8/31	9/2*
	6231	8/5	1	1	:	1	1	1	:	;	1	;	9/2	8/14	. !	1
	6232	8/5	ł	:	1	;	;	:	:	;	;	;	9/2	8/14	:	1
	6233	8/5	1	1	!	1	1	!	;	!		;	9/2	8/14	;	1
	6234	8/5	8/12	8/7	4/6	8/13	ŀ	;	1	:			9/2	8/14	;	;
	6235	8/5	8/12	8/7	4/6	8/13	1	1	;	!	-	;	9/5	8/14	!	1
	6236	8/5	8/12	8/7	9/4	8/13	1	;	;	1	;	-	9/2	8/14	1	1
	6237	8/5	8/12	8/7	4/6	8/13	:	<u></u>	;	1	1	;	9/5	8/15	!	1
	6238	8/5	8/12	8/7	9/4	8/13	ŀ	1	;	1	;	!	9/5	8/15	1	1
	6239	8/5	8/12	8/7	4/6	8/13	;	1	;	;	1	!	9/2	8/15	;	;
	6240	8/5	8/12	8/7	4/6	8/13	1	;	1	:	-	;	9/2	8/15	:	1
	6241	8/5	8/12	8/7	4/6	8/13	;	!	1	- 	1		3/5	8/15	;	1
														_		
	· ·															

\*Analyzed late

DEAD: EXTR: ANAL: ( ): S+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time.
Holding time expiration based on sample date.
Holding time expiration based on sample date.

TOSSOCIATIONS NO TOSSOCIATIONS NO TOSSOCIATIONS NO TOSSOCIATIONS NO TOSSOCIATIONS NO TOSSOCIATIONS NO TOSSOCIA



SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

\$\frac{1}{2}\left\foralleq \frac{1}{2}\left\frac{1}{2}\left\foralleq \frac{1}{2}\left\frac{1}{2}\left\foralleq \frac{1}{2}\left\foralleq \frac{1}{2}\left\foralleq \frac{1}{2}\left\foralleq \frac{1}{2}\left\foralleq \frac{1}{2}\left\foralleq \frac{1}{2}\left\foralleq \frac{1}{2}\left\foralleq \frac{1}{2}\left\foralleq \frac{1}{2}\left\foralleq \frac{1}{2}\left\foralleq \frac{1}{2}\left\foralleq \frac{1}{2}

U-3854.1

	Pet. HC(28)	Anal	1111
	Pet.	Dead	11111
	0&G(28)	Anal	% % % % % % % % % % % % % % % % % % %
	080	Dead	60000 00000000000000000000000000000000
	TDS (7)	Anal	11111
	105	Dead	1111
	Analysis	Anal	1111
+ 40)	Anal	Dead	11111
BNA(7/E + 40)	ction	Extr	1111
_,	Extraction	Dead	
	Analysis	Anal	8/13 8/13 1-13
5 + 30)	Anal	Dead	4/6
PAH (7/5 + 30)	ction	Extr	84/7 84/7 84/7 1-
	Extraction	Dead	8/12 8/12 8/12 
	Comple	Date	8/5 8/5 8/5 8/5
	وامهري	Number	6242 6243 6244 6246 6246
	4	200	3854

DEAD:
EXTR:
ANAL:
( ):
S+#:
E+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time.
Holding time expiration based on sample date.
Holding time expiration based on extraction date.

SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

													_										
	Analysis	Anal		:	:	1	1	1	;	:	1	;	1	;	1	1	;	;	1	ļ	1	;	;
/E+30)	Anal	Dead		ļ	1	1	}	1	1	1	;	1	;	;	;	1	1	1	-	;	1	;	1
Phenole(7/E+30)	Extraction	Extr		;	;	;	t 1	;	;	1	;	1	1	;	;	1	1	1	;	;	1	;	
됩	Extre	Dead		1	1	1	1	1	1	1	1	1	;	;	¦	i	1	1	1	;	1	1	!
7	Analysis	Anal		ł	1	1	-	8/8	8/8	8/8	1	1	1	1	<u> </u>	;	;	;	;	1	i	1	;
(7/5+14	Anal	Dead		<del> </del>	;	;	1	9/6	9/6	9/6	1	1	;	1	1	-	;	1	ł	¦	1	ł	1
Organophos(7/S+14)	Extraction	Extr		1	;	ļ	1	8/7	8/7	2/8	1	1	1	!	1	;	1	;	1	!	1	:	
티	Extra	Dead		1	!	1	1	8/12			;	:	;	1	;	1	-	1	1	:	;	1	;
	Analysis	Anal		!	;	1	1	8/12	8/12	8/12	1	1	1	1	;	1	;	1	1	1	1	1	1
7/E+40)	Ana	Dead		!	!	;	;	9/16	9/16	9/16	;	;	;	;	ŀ	!	;	¦	1	<b>!</b>	;	1	1
Pest/PCB(7/E+40)	Extraction	Extr		!	1	1	<u> </u>	1/8	8/1	8/1	;	;	1	;	;	;	1	;	1	1	1	;	;
21	Extre	Dead		!	!	;	1	8/12			1	;	1	;	;	1	1	;	1	i	;	1	!
	Analysis	Anal		1	1	1	\ 	8/13	8/13	8/13	1	1	;	;	1	;	;	;	;	;	;	1	;
Herb(7/E+30)	Ana	Dead		!	!	!	- -	9/6	9/6	9/6	1	<u> </u>	;	1	!	:	!	1	1	;	;	ŀ	!
Herb(	Extraction	Extr		!	1	1	•	8/11	_	_	•	1	;	;	1	;	;	:	;	;	!	ŀ	;
	Extr	Dead		:	1	!	;	8/12	8/12	8/12	;		1	:	1	1	1	1	1	;	!	1	
	VOA(14)	Anal			B, / /B		1,1/8	11,7/8	11,7/8	8/7,11	11,7/8	8/7,11	8/7,11	8/7,11	11,7/8	11,1/8	11,7/8	8/7,11	11,7/8	8/7,11	8/8,11	8/8,11	8/8,11
	Š	Dead	04/0	6/18	8/19	8/19	8/19	8/19	8/19	8/19	8/19	8/19	8/19	8/19	8/19	8/19	8/19	8/19	8/19	8/19	8/19	8/19	8/19
	Comple	Date	9,6	6/2	<b>6//8</b>	8/8	8/5	8/5	8/2	8/5	8/2	8/2	8/2	8/5	8/5	8/2	8/2	8/5	8/5	8/5	8/5	8/5	8/2
	9 (000)	Number		1779	6228	6229	6230	6231	6232	6233	6234	6235	6236	6237	6238	6239	6240	6241	6242	6243	6244	6245	9779
	5		, , ,	824																			

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time expires.
Holding time based on sample date.
Holding time based on sample catraction. DEAD: EXTR: ANAL: ( ): S+#:

H-192



FOR

REESE AIR FORCE BASE

U-3854.6

/3 & 5/86 /6/86 oil 6227 9057	6228 9058	<del></del>	9: E & E By: Feder 6230 9060	<del></del>	6232
6227 9057	9058	Delivered	By: Feder	el Express	ļ
9057	9058	6229	6230	6231	ļ
9057	9058				ļ
		9059	9060	9084	9085
					<b></b>
	_				
esults in:	mg/kg*	unless note	d		<b>4</b>
49	<10	100	<10	NR	NR
					<100
			i .	1	<15
1		1		1	<1
		1		li .	<0.5
	- •	3		1	7.98
		1	ł		5.34
	-	1		•	4.38
		1	į.	ł	<10
		1	1	(	<4
		1			<20
		l	1		20.0
	49 <100 NR NR NR 8.62 NR 6.49 NR NR NR NR	<100 <100 NR NR NR NR NR NR NR NR NR NR NR NR NR	<100	<100	<100

#### Analytical References:

"Test the thods," SW 846, Second Edition, U.S. EPA, 1982. Supervising Analyst:

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recycled paper, ...

<sup>\*:</sup> As received. +: Elevated detection limits due to matrix interferences. NR: Analysis not requested.



FOR

#### REESE AIR FORCE BASE

U-3854.7

w. :		•				
Job No.:	U-3854		RE:	DF-20	100	
Sample Date:	8/3 & 5/86		P.O. No.:	<del></del>		
Date Received:	8/6/86		Sampled B	Sy: E&E	, Inc.	
Sample Type:	Soil		Delivered	By: Feder	al Express	
E & E Lab. No. 86-	6233	6234	6235	6236	6237	6238
Customer No.	9086	9093	9094	9095	9096	9097
Sample Identity						
	Results in	: mg/kg*	unless note	ed	<b></b>	
Oil and Grease	<100	<100	158	<100	<100	139
Antimony	<15	NR	NR	NR	NR	NR NR
<b>Beryllium</b>	<1	NR	NR	NR	NR	NR
Cadmium	<0.5	NR	NR	NR	NR	NR
Chromium	<5	NR	NR	NR	NR	NR
Copper	2.12	NR	NR	NR	NR	NR
Lead	2.90	NR	NR	NR	NR	NR
Nickel	<10	NR	NR	NR	NR	NR
Silver	<4	NR	NR	NR	NR	NR
Thallium	<20	NR	NR	NR	NR	NR
Zinc	7.69	NR	NR	NR	NR	NR
Solids, %	87	92	91	90	93	91

NR: Analysis not requested. \*: As received.

#### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.



FOR

#### REESE AIR FORCE BASE

U-3854.8

Job No.:	U-3854		RE:	DF -20	100	
Sample Date:	8/3 & 5/8	6	P.O. No.:			
Date Received:	8/6/86	-	Sampled B	ly: E&E	, Inc.	
Sample Type:	Soil		Delivered	l By: Feder	al Express	
E & E Lab. No. 86-	6239	6240	6241	6242	6243	62 44
Customer No.	9098	9099	9100	9101	9102	9103
Sample Identity						
	Results i	n: mg/kg*	unless note	ed	<del> </del>	<del></del>
Oil and Grease Solids, %	<100 94	178 94	<100 93	<100 92	1400 92	<100 93

\*: As received. NR: Analysis not requested.

#### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.





FOR

REESE AIR FORCE BASE

U-3854.9

Job No.:	U-3854		RE:	DF-20	000	
Sample Date:	8/3 & 5/86	<u> </u>	P.O. ⅓o.:			
Date Received:	8/6/86		Sampled B	y: E&E	, Inc.	
Sample Type:	Soil		Delivered	By: Feder	ral Express	
E & E Lab. No. 86-	6245	6246	Blankt			
Customer No.	9104	9138				
Sample Identity						
	Results in	n: mg/kg*	unless note	ď	4	
Petroleum Hydrocarbons		n: mg/kg*	unless note	d	<b>I</b>	
Petroleum Hydrocarbons Oil and Grease			l	d		
	NR	NR	<10	d		
Oil and Grease	NR <100	NR <100	<10 NA	d		
Oil and Grease Antimony	NR <100 NR	NR <100 NR	<10 NA <0.15	đ		
Oil and Grease Antimony Beryllium Cadmium Chromium	NR <100 NR NR	NR <100 NR NR	<10 NA <0.15 <0.01	đ		
Oil and Grease Antimony Beryllium Cadmium Chromium Copper	NR <100 NR NR NR NR	NR <100 NR NR NR NR	<10 NA <0.15 <0.01 <0.005 <0.05 <0.02	d		
Oil and Grease Antimony Beryllium Cadmium Chromium Copper Lead	NR <100 NR NR NR NR NR	NR <100 NR NR NR NR	<10 NA <0.15 <0.01 <0.005 <0.05 <0.02 <0.005	d		
Oil and Grease Antimony Beryllium Cadmium Chromium Copper Lead Nickel	NR <100 NR NR NR NR NR NR	NR <100 NR NR NR NR NR	<10 NA <0.15 <0.01 <0.005 <0.05 <0.02 <0.005 <0.01	d		
Oil and Grease Antimony Beryllium Cadmium Chromium Copper Lead Nickel Silver	NR <100 NR NR NR NR NR NR NR	NR <100 NR NR NR NR NR NR NR	<10 NA <0.15 <0.01 <0.005 <0.05 <0.02 <0.005 <0.1 <0.04	đ		
Oil and Grease Antimony Beryllium Cadmium Chromium Copper Lead Nickel Silver Thallium	NR <100 NR NR NR NR NR NR NR NR	NR <100 NR NR NR NR NR NR NR NR	<10 NA <0.15 <0.01 <0.005 <0.05 <0.02 <0.005 <0.1 <0.04 <0.20	đ		
Oil and Grease Antimony Beryllium Cadmium Chromium Copper Lead Nickel Silver	NR <100 NR NR NR NR NR NR NR	NR <100 NR NR NR NR NR NR NR	<10 NA <0.15 <0.01 <0.005 <0.05 <0.02 <0.005 <0.1 <0.04	đ		

NR: Analysis not requested.
NA: Not applicable
\*: As received.
†: mg/L

#### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

## RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

U-3854.10

	E & E Lab. No. 86-	Blank	Blank	6227	6228	6229
Compound	Sample Identity	8/7/86	8/7/86	9057	9058	<del>9</del> 059
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene		<250	<250	<250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250

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## RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E & E Lab. No. 86-	6230	6231	6232	6233	6234
Compound	Sample Identity	9060	9084	9085	9086	9093
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene		<250	<250	<250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250
		<u> </u>		L		1

# ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E & E Lab. No. 86-	6235	6236	6237	6238	6239
Compound	Sample Identity	9094	9095	<b>9</b> 096	9097	9098
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene		<250	<250	<250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250

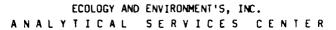
# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

U-3854.13

	E & E Lab. No. 86-	6240	6241	6242	6243	6244
Compound	Sample Identity	9099	9100	9101	9102	9103
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
taluene		<250	<250	₹250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250



# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E & E Leb. No. 86-	6245	6246	B1 ank	
Compound	Sample Identity	9104	9138	8/8/86	
chlorobenzene		<250	<250	<250	
1,2-dichlorobenzene		<500	<500	<500	
1,3-dichlorobenzene		<500	<500	<500	
1,4-dichlorobenzene		<500	<500	<500	
benzene		<250	<250	<250	
total xylenes		<500	<500	<500	
toluene		<250	<250	<250	
ethylbenzene		<250	<250	<250	

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

U-3854.15

		(ug	/kg)	Relative	
Parameter	E&E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)	
chlorobenzene	6236	<250	<250		
1,2-dichlorobenzene	6236	<500	<500	<del></del>	
1,3-dichlorobenzene	6236	<500	<500		
1,4-dichlorobenzene	6236	<500	<500	**=	
benzen <b>e</b>	6236	<250	<250		
total xylenes	6236	<500	<500		
toluene	6236	<250	<250		
ethyl benzene	6236	<250	<250		

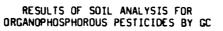
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# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

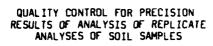
	E & E	Original Value	Amount Added	Amount Determined	
Compound	Laboratory No. 86-		Percent Recovery		
1,2-dichlorobenzene	6243	<500	1250	1189	95
1,3-dichlorobenzene	6243	<500	1250	924	74
1,4-dichlorobenzene	6243	<500	1250	1133	91
toluene	6243	<250	1250	932	75
ethyl benzene	6243	<250	1250	1021	82
	1				

# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R



(all results in mg/kg as received)

	E & E Lab. No. 86-	Blank	6231	6232	6233	
Compound	Sample Identity	8/7/86	9084	9085	9086	
Naled		<1.0	<1.0	<1.0	<1.0	
Phorate		<1.0	<1.0	<1.0	<1.0	
Disulfoton		<1.0	<1.0	<1.0	<1.0	
Chlorpyrifos		<1.0	<1.0	<1.0	<1.0	
Dimethoste	Į	<1.0	<1.0	<1.0	<1.0	
Malathion		<1.0	<1.0	<1.0	<1.0	
Mevinphos		<1.0	<1.0	<1.0	<1.0	
Parathion		<1.0	<1.0	<1.0	<1.0	
Methyl parathion		<1.0	<1.0	<1.0	<1.0	
Diazinon		<1.0	<1.0	<1.0	<1.0	
Methyl azinphos		<1.0	<1.0	<1.0	<1.0	



		(mg/	kg)	Relative
Parameter 	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Naled	6231	<1.0	<1.0	
Phorate	6231	<1.0	<1.0	
Disulfoton	6231	<1.0	<1.0	
Chlorpyrifos	6231	<1.0	<1.0	
Dimethoate	6231	<1.0	<1.0	
Malathion	6231	<1.0	<1.0	
Mevinphos	6231	<1.0	<1.0	
Parathion	6231	<1.0	<1.0	
Methyl parathion	6231	<1.0	<1.0	
Diazinon	6231	<1.0	<1.0	
Methyl azinphos	6231	<1.0	<1.0	



FOR

#### REESE AIR FORCE BASE

U-3854.19

Job No.: U-3854			RE:		DF -200	0	
Sample Date: 8/3,5/	B6		P.0	. No.:			
Date Received: 8/6/86			Sam	pled By:	Ε&Ε,	Inc.	
Sample Type: Soil			Del	ivered By	: Federa	l Express	
RESULTS OF CHEMICAL A	NALYSIS O	F EXTRACT	S FROM EP	TOXICITY	TESTS &	IGNITABIL	ITY
	/L			Maximum Allowable Concen- tration (mg/L)			
E & E Lab. No. 86-	6247	6248	6249	6250	6251	6252	
Customer No.	9173	9174	9175	9176	9177	9178	
Sample Identity							
Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Endrin Lindane Methoxychlor Toxaphene 2,4-D 2,4,5-TP (Silvex) Ignitability, *F	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR NR NR	5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.02 0.4 10.0 0.5

NR: Not requested.

Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

orher A 1811 id

Date:

H-206



FOR

#### REESE AIR FORCE BASE

U-3854.20

Job No.: U-385	4		RE	:	DF-2000				
Sample Date: 8/3,5	/86		P.0	P.O. No.:					
Date Received: 8/6/8	16		San	pled By:	Ε&Ε, Ι	nc.			
Sample Type: Soil			Del	ivered By	: Federal	Express			
RESULTS OF CHEMICAL	ANALYSIS OF	EXTRACTS I	ROM EF	TOXICITY	TESTS & IG	NITABIL	ITY		
		mg/L							
E & E Lab. No. 86-	6253	Blank							
Customer No.	9179								
Sample Identity			· · · · · · · · · · · · · · · · · · ·						
Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Endrin Lindane Methoxychlor Toxaphene 2,4-D 2,4,5-IP (Silvex) Ignitability, °F	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR					5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.02 0.4 10.0 0.5 10.0		

NR: Not requested. NA: Not applicable.

#### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst:

Date:

### ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

# RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg, as received)

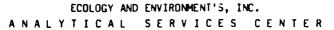
U-3854.21

MARTINE BALLET STATES BALLES

	E & E Lab. No. 86-	Blank	Blank	Blank	Blank	6227	6228
Compound	Sample Identity	8/8/86	8/11/86	8/11/86	8/11/86	9057	9058
carbon tetrachloride		<250	<250	<250	<250	<250	<250
1,2-dichloroethane	İ	<100	<100	<100	<100	<100	<100
1,1,1-trichloroethane	,	<250	<250	<250	<250	<250	<250
1,1-dichloroethane	i	<100	<100	<100	<100	<100	<100
1,1,2-trichloroethan	,	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloroet	hane	<250	<250	<250	<250	<250	<250
chloroethane	Ì	<500	<500	<500	<500	<500	<500
2-chloroethylvinyl e	her	<5000	<5000	<5000	<5000	<5000	<5000
chloroform	Ì	<250	<250	<250	<250	<250	<250
1,1-dichloroethene	ļ.	<100	<100	<100	<100	<100	<100
trans-1,2-dichloroet	nene	<100	<100	<100	<100	<100	<100
1,2-dichloropropane	i	<1000	<1000	<1000	<1000	<1000	<1000
trans-1,3-dichloropro	opene	<1000	<1000	<1000	<1000	<1000	<1000
cis-1,3-dichloroprope	ene	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride		120	66	100	<50	<50	<50
chloromethane	1	<500	<500	<500	<500	<500	<500
bromomethane	i	<500	<500	<500	<500	<500	<500
bromoform	ļ	<1000	<1000	<1000	<1000	<1000	<1000
bromodichloromethane		<250	<250	<250	<250	<250	<250
fluorotrichlorometha	ne	<500	<500	<500	<500	<500	<500
dichlorodifluorometh	ane	<500	<500	<500	<500	<500	<500
chlorodibromomethane	1	<250	<250	<250	<250	<250	<250
tetrachloroethene	j	<250	<250	<250	<250	<250	<250
trichloroethene	ļ	<250	<250	<250	<250	<250	<250
vinyl chloride	1	<500	<500	<500	<500	<500	<500

NOTE: Due to low level artifacts present in the methanol used for internal standard preparation and sample extraction, all samples have been blank subtracted. The actual value of the blank has been reported.

COORDER CONTRACTOR DESCRIPTION OF THE PROPERTY



RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg, as received)

U-3854.22

	E & E Lab. No. 86-	6229	6230	6231	6232	6233	6234
Compound	Sample Identity	9059	9060	9084	9085	9086	9093
carbon tetrachloride		<250	<250	<250	<250	<250	<250
1,2-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,1-trichloroethan	e	<250	<250	<250	<250	<250	<250
1,1-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,2-trichloroethan	e	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloroe	thane	<250	<250	<250	<250	<250	<250
chloroethane		<500	<500	<500	<500	<500	<500
2-chloroethylvinyl e	ther	<5000	<5000	<5000	<5000	<5000	<5000
chloroform		<250	<250	<250	<250	<250	<250
1,1-dichloroethene		<100	<100	<100	<100	<100	<100
trans-1,2-dichloroet	hene	<100	<100	<100	<100	<100	<100
1,2-dichloropropane		<1000	<1000	<1000	<1000	<1000	<1000
trans-1,3-dichloropr	opene	<1000	<1000	<1000	<1000	<1000	<1000
cis-1,3-dichloroprop	ene	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride		<50	<50	<50	<50	<50	<50
chloromethane	į	<500	<500	<500	<500	<500	<500
bromomethane		<500	<500	<500	<500	<500	<500
bromoform		<1000	<1000	<1000	<1000	<1000	<1000
bromodichloromethane		<250	<250	<250	<250	<250	<250
fluorotrichlorometha	ne	<500	<500	<500	<500	<500	<500
dichlorodifluorometh	ane	<500	<500	<500	<500	<500	<500
chlorodibromomethane		<250	<250	<250	<250	<250	<250
tetrachloroethene		<250	<250	<250	<250	<250	<250
trichloroethene		<250	<250	<250	<250	<250	<250
vinyl chloride		<500	<500	<500	<500	<500	<500

NOTE: Due to low level artifacts present in the methanol used for internal standard preparation and sample extraction, all samples have been blank subtracted. The actual value of the blank has been reported.

# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg, as received)

U-3854.23

	E & E Lab. No. 86-	6235	6236	6237	6238	6239	6240
Compound	Sample Identity	9094	9095	9096	9097	9098	9099
carbon tetrachlorid	e	<250	<250	<250	<250	<250	<250
1,2-dichloroethane	}	<100	<100	<100	<100	<100	<100
1,1,1-trichloroetha	ne	<250	<250	<250	<250	<250	<250
1,1-dichloroethane	į	<100	<100	<100	<100	<100	<100
1,1,2-trichloroetha	ne	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloro	ethane	<250	<250	<250	<250	<250	<250
chloroethane		<500	<500	<500	<500	<500	<500
2-chloroethylvinyl	ether	<5000	<5000	<5000	<5000	<5000	<5000
chloroform		<250	<250	<250	<250	<250	<250
1,1-dichloroethene	ţ	<100	<100	<100	<100	<100	<100
trans-1,2-dichloroe	thene	<100	<100	<100	<100	<100	<100
1,2-dichloropropane	ĺ	<1000	<1000	<1000	<1000	<1000	<1000
trans-1,3-dichlorop	ropene	<1000	<1000	<1000	<1000	<1000	<1000
cis-1,3-dichloropro	pene	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride	-	<50	<50	<50	<50	<50	<50
chloromethane		<500	<500	<500	<500	<500	<500
bromomethane		<500	<500	<500	<500	<500	<500
bromoform		<1000	<1000	<1000	<1000	<1000	<1000
bromodichloromethan	e	<250	<250	<250	<250	<250	<250
fluorotrichlorometh	ane	<500	<500	<500	<500	<500	<500
dichlorodifluoromet	hane	<500	<500	<500	<500	<500	<500
chlorodibromomethan	e	<250	<250	<250	<250	<250	<250
tetrachloroethene		<250	<250	<250	<250	<250	<250
trichloroethene		<250	<250	<250	<250	<250	<250
vinyl chloride		<500	<500	<500	<500	<500	<500

NOTE: Due to low level artifacts present in the methanol used for internal standard preparation and sample extraction, all samples have been blank subtracted. The actual value of the blank has been reported.

H-210



RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg, as received)

U-3854.24

	E & E Lab. No. 86-	6241	6242	6243	6244	6245	6246
Compound	Sample Identity	9100	9101	9102	9103	9104	9138
carbon tetrachloride		<250	<250	<250	<250	<250	<250
1,2-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,1-trichloroethan	e	<250	<250	<250	<250	<250	<250
1,1-dichloroethane	ł	<100	<100	<100	<100	<100	<100
1,1,2-trichloroethan	e	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloroe	thane	<250	<250	<250	<250	<250	<250
chloroethane	Ì	<500	<500	<500	<500	<500	<500
2-chloroethylvinyl e	ther	<5000	<5000	<5000	<5000	<5000	<5000
chloroform	)	<250	<250	<250	<250	<250	<250
1,1-dichloroethene	i	<100	<100	<100	<100	<100	<100
trans-1,2-dichloroet	hene	<100	<100	<100	<100	<100	<100
1,2-dichloropropane	]	<1000	<1000	<1000	<1000	<1000	<1000
trans-1,3-dichloropr	opene )	<1000	<1000	<1000	<1000	<1000	<1000
cis-1,3-dichloroprop	ene	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride	]	<50	<50	<50	<50	<50	<50
chloromethane	i	<500	<500	<500	<500	<500	<500
bromomethane		<500	<500	<500	<500	<500	<500
bromoform	l	<1000	<1000	<1000	<1000	<1000	<1000
bromodichloromethane		<250	<250	<250	<250	<250	<250
fluorotrichlorometha	ne	<500	<500	<500	<500	<500	<500
dichlorodifluorometh	ane	<500	<500	<500	<500	<500	<500
chlorodibromomethane	]	<250	<250	<250	<250	<250	<250
tetrachloroethene	j	<250	<250	<250	<250	<250	<250
trichloroethene		<250	<250	<250	<250	<250	<250
vinyl chloride	j	<500	<500	<500	<500	<500	<500

NOTE: Due to low level artifacts present in the methanol used for internal standard preparation and sample extraction, all samples have been blank subtracted. The actual value of the blank has been reported.

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE AMALYSES OF SOIL SAMPLES

	E&E	(	Relative	
Compo und	Laboratory No. 86- 6236	Original Analysis	Replicate Analysis	Percent Difference (RPD)
carbon tetrachloride		<250	<250	
1,2-dichloroethane		<100	<100	
1,1,1-trichloroethane		<250	<250	
1,1-dichloroethane		<100	<100	
1,1,2-trichloroethane		<500	<500	
1,1,2,2-tetrachloroethane		<250	<250	
chloroethane		<500	<500	
2-chloroethylvinyl ether		<5000	<5000	
chloroform		<250	<250	
1,1-dichloroethene	ļ	<100	<100	
trans-1,2-dichloroethene		<100	<100	
1,2-dichloropropane	l	<1000	<1000	
trans-1,3-dichloropropene	,	<1000	<1000	
cis-1,3-dichloropropene		<1000	<1000	
methylene chloride	1	<50	<50	
chloromethane	į	<500	<500	
bromomethane		<500	<500	
bromoform	j	<1000	<1000	
bromodichloromethane	<b>{</b>	<250	<250	
fluorotrichloromethane	1	<500	<500	
dichlorodifluoromethane	1	<500	<500	
chlorodibromomethane	1	<250	<250	<b></b>
tetrachloroethene	1	<250	<250	
trichloroethene		<250	<250	
vinyl chloride		<500	<500	<b>_</b>



# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E & E Laboratory	Original Value	Amount Added	Amount Determined			
Compound	No. 86- 6246		(ug/kg)				
carbon tetrachloride		<250	1250	1115	89.2		
1,2-dichloroethane		<100	1250	1300	104		
1,1,1-trichloroethane		<250	1250	1165	93.2		
1,1-dichloroethane		<100	1250	1161	92.9		
chloroethane		<500	1250	1072	85.8		
chloroform		<250	1250	1250	100		
trans-1,2-dichloroethene		<100	1250	1215	97.2		
methylene chloride		<50	1250	1004	80.3		
chloromethane		<500	1250	941.2	75.3		
bromomethane		<500	1250	1191	95.3		
bromoform		<1000	1250	1450	116		
bromodichloromethane		<250	1250	1099	87.9		
trichloroethene		<250	1250	1288	103		

# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PESTICIDES, PCBB AND HERBICIDES BY GC

(all results in ug/g as received)

	E & E Lab. No. 86-	6231	6232	6233	Blank		
Compound	Sample Identity	9084	9085	9086	8/7/86		
Aldrin		<1.0	<1.0	<1.0	<1.0		1
e-BHC		<1.0	<1.0	<1.0	<1.0		
b-BHC		<1.0	<1.0	<1.0	<1.0		
g-BHC		<1.0	<1.0	<1.0	<1.0		1
1-BHC		<1.0	<1.0	<1.0	<1.0		
Chlordane		<1.0	<1.0	<1.0	<1.0		1
4,4'-DDD		<1.0	<1.0	<1.0	<1.0	-	
,4'-DOE		<1.0	<1.0	<1.0	<1.0		
,4'-DDT		<1.0	<1.0	<1.0	<1.0		1
ieldrin		<1.0	<1.0	<1.0	<1.0		1
indosulfan I	;	<1.0	<1.0	<1.0	<1.0		ļ
indosulfan II	:	<1.0	<1.0	<1.0	<1.0		ł
Indosulfan sulfate		<1.0	<1.0	<1.0	<1.0		1
Indrin		<1.0	<1.0	<1.0	<1.0		1
Indrin aldehyde		<1.0	<1.0	<1.0	<1.0		
leptachlor		<1.0	<1.0	<1.0	<1.0		
deptachlor epoxide		<1.0	<1.0	<1.0	<1.0		
PCB - 1016		<1.0	<1.0	<1.0	<1.0		
PCB - 1221		<1.0	<1.0	<1.0	<1.0		
PCB - 1232		<1.0	<1.0	<1.0	<1.0		
PCB - 1242		<1.0	<1.0	<1.0	<1.0	ļ	1
PCB - 1248	j	<1.0	<1.0	<1.0	<1.0	i	
PCB - 1254		<1.0	<1.0	<1.0	<1.0		1
PCB - 1260		<1.0	<1.0	<1.0	<1.0		]
l'oxaphene		<1.0	<1.0	<1.0	<1.0		1
2,4-D		<1.0	<1.0	<1.0	<1.0		1
2,4,5-TP (Silvex)		<1.0	<1.0	<1.0	<1.0		
2,4,5-1		<1.0	<1.0	<1.0	<1.0		ŀ

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

	E & E	(u	(ug/g)		
Parameter	Laboratory No. 86- 6231	Original Analysis	Replicate Analysis	Percent Difference (RPD)	
Aldrin		<1.0	<1.0		
e-BHC		<1.0	<1.0		
b-BHC		<1.0	<1.0		
g-BHC	}	<1.0	<1.0	<del></del>	
d-BHC		<1.0	<1.0		
Chlordane		<1.0	<1.0		
4,4'-DDD	i	<1.0	<1.0		
4,4'-DDE		<1.0	<1.0		
4,4'-DDT		<1.0	<1.0	<b> </b>	
Dieldrin		<1.0	<1.0		
Endosulfan I		<1.0	<1.0		
Endosulfan II	İ	<1.0	<1.0		
Endosulfan sulfate		<1.0	<1.0		
Endrin		<1.0	<1.0		
Endrin aldehyde	ĺ	<1.0	<1.0	ļ	
Heptachlor		<1.0	<1.0		
Heptachlor epoxide		<1.0	<1.0		
PCB - 1016		<1.0	<1.0		
PCB - 1221		<1.0	<1.0		
PCB - 1232		<1.0	<1.0		
PCB - 1242		<1.0	<1.0		
PCB 1248		<1.0	<1.0		
PCB = 1254	Ì	<1.0	<1.0		
PCB - 1260	- [	<1.0	<1.0		
Toxaphene		<1.0	<1.0		

# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

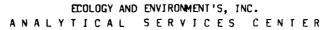
# RESULTS OF SOIL ANALYSIS FOR POLYNUCLEAR AROMATIC HYDROCARBONS (all results in ug/g as received)

	E & E Lab. No. 86-	Blank	6234	6235	6236	6237	
Compound	Sample Identity	8/7/86	9093	9094	9095	9096	
acenaphthene		<5.0	<5.0	<5.0	<5.0	<5.0	
fluoranthene		<5.0	<5.0	<5.0	<5.0	<5.0	
napthalene		<5.0	<5.0	<5.0	<5.0	<5.0	
benzo(a)anthracene		<5.0	<5.0	<5.0	<5.0	<5.0	
benzo(a)pyrene		<5.0	<5.0	<5.0	<5.0	<5.0	
benzo(b)fluoranthene		<5.0	<5.0	<5.0	<5.0	<5.0	
benzo(k)fluoranthene		<5.0	<5.0	<5.0	<5.0	<5.0	
chrysene		<5.0	<5.0	<5.0	<5.0	<5.0	İ
acenaphthylene		<5.0	<5.0	<5.0	<5.0	<5.0	
anthracene		<5.0	<5.0	<5.0	<5.0	<5.0	
benzo(ghi)perylene	Ì	<5.0	<5.0	<5.0	<5.0	<5.0	
fluorene		<5.0	<5.0	<5.0	<5.0	<5.0	
phenanthrene		<5.0	<5.0	<5.0	<5.0	<5.0	
dibenzo(a,h)anthracen	1	<5.0	<5.0	<5.0	<5.0	<5.0	
indeno(1,2,3-cd)pyren	e	<5.0	<5.0	<5.0	<5.0	<5.0	
pyrene		<5.0	<5.0	<5.0	<5.0	<5.0	
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# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

# RESULTS OF SOIL ANALYSIS FOR POLYNUCLEAR AROMATIC HYDROCARBONS (all results in ug/g as received)

E & E Lab. No. 86-	6238	6239	6240	6241	6242	
Sample Identity	9097	9098	9099	9100	9101	
	<5.0	<5.0	<5.0	<5.0	<5.0	
1	<5.0	<5.0	<5.0	<5.0	<5.0	
	<5.0	<5.0	<5.0	<5.0	<5.0	
ì	<5.0	<5.0	<5.0	<5.0	<5.0	
Ĭ	<5.0	<5.0	<5.0	<5.0	<5.0	
	<5.0	<5.0	<5.0	<5.0	<5.0	
i	<5.0	<5.0	<5.0	<5.0	<5.0	
	<5.0	<5.0	<5.0	<5.0	<5.0	
ŧ	<5.0	<5.0	<5.0	<5.0	<5.0	
-	<5.0	<5.0	<5.0	<5.0	<5.0	
	<5.0	<5.0	<5.0	<5.0	<5.0	
İ	<5.0	<5.0	<5.0	<5.0	<5.0	
l	<5.0	<5.0	<5.0	<5.0	<5.0	
e	<5.0	<5.0	<5.0	<5.0	<5.0	
e	<5.0	<5.0	<5.0	<5.0	<5.0	
	<5.0	<5.0	<5.0	<5.0	<5.0	
	No. 86- Sample	Sample Identity 9097    \$\color 5.0 \\     \colo	Sample Identity 9097 9098    \$\frac{\(5.0\)}{\(5.0\)} \(\frac{\(5.0\)}	No. 86-       6238       6239       6240         Sample Identity       9097       9098       9099         <5.0	No. 86-       6238       6239       6240       6241         Sample Identity       9097       9098       9099       9100         <5.0	No. 86-         6238         6239         6240         6241         6242           Sample Identity         9097         9098         9099         9100         9101           <5.0



#### RESULTS OF SOIL ANALYSIS FOR POLYNUCLEAR AROMATIC HYDROCARBONS (all results in ug/g as received)

U-3854.32

	E & E Lab. No. 86-	6243	6244	6245	6246	
Compound	Sample Identity	9102	9103	9104	9138	
ac enaphth en e	·	<1.0	<1.0	<1.0	NA NA	
fluoranth <i>e</i> ne		<1.0	<1.0	<1.0	NA NA	1
naphthal en e		<1.0	<1.0	<1.0	NA NA	1
benzo(a)anthtacene		<1.0	<1.0	<1.0	NA NA	ļ
benzo(a)pyrene		<1.0	<1.0	<1.0	NA NA	ţ
benzo(b)fluoranthene	:	<1.0	<1.0	<1.0	NA NA	ļ
benzo(k)fluoranthene		<1.0	<1.0	<1.0	NA NA	
chrys en e	ļ	<1.0	<1.0	<1.0	NA NA	1
ac enaphthyl en e		<1.0	<1.0	<1.0	NA NA	
anthrac en e	İ	<1.0	<1.0	<1.0	NA NA	
benzo(ghi)perylene		<1.0	<1.0	<1.0	NA .	1
fluorene	ı	<1.0	<1.0	<1.0	NA	i
phenanthrene	ł	<1.0	<1.0	<1.0	NA NA	1
dibenzo(a,h)anthrace	ne	<1.0	<1.0	<1.0	NA	ļ
indeno(1,2,3-cd)pyrer		<1.0	<1.0	<1.0	NA	1
pyrene		<1.0	<1.0	<1.0	NA	1
ot analyzed due to sam	mple loss in L	ab accident				
			H-218			

# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E & E Laboratory	Original Value	Amount Added	Amount Determined		
Parameter	No. 86- 6239		(ug/g	)	Percent Recovery	
acenaphthene fluoranthene naphthalene benzo(a)anthracene benzo(b)fluoranthene benzo(k)fluoranthene chrysene acenaphthylene anthracene benzo(ghi)perylene fluorene phenanthrene dibenzo(a,h)anthracene indeno(1,2,3-cd)pyrene pyrene		<1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0	20 20 20 20 20 20 20 20 20 20 20 20 20 2	15 14 13 18 18 18 18 16 14 15 18 15 14 18 17 15		

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

	E&E	(	ug/g)	Relative
Parameter	Laboratory No. 86- 6242	Original Analysis	Replicate Analysis	Percent Difference (RPD)
acenaphthlene		<1.0	<1.0	
fluoranthene		<1.0	<1.0	
naphthalene		<1.0	<1.0	
benzo(a)anthracene	1	<1.0	<1.0	
benzo(a)pyrene		<1.0	<1.0	
benzo(k)fluoranthene	1	<1.0	<1.0	
benzo(k)fluoranthene		<1.0	<1.0	
chrysene	[	<1.0	<1.0	
acenaphthylene	<b>\</b>	<1.0	<1.0	
anthracene	1	<1.0	<1.0	<b> </b>
benzo(ghi)perylene		<1.0	<1.0	
fluorene		<1.0	<1.0	
phenanthrene		<1.0	<1.0	i
dibenzo(a,h)anthracene		<1.0	<1.0	<b>!</b>
ideno(1,2,3-cd)pyrene		<1.0	<1.0	
pyrene		<1.0	<1.0	

# QUALITY CONTROL FOR ACCURACY: PERCENT DIFFERENCE--EPA QUALITY ASSURANCE MATERIALS

•	Concentra		
Parameter	Knewn	Determined	Percent Difference
Antimony	990	1112	12.3
Beryllium	960	1006	4.8
Cadmium	1300	1150	11.5
Chromium	6500	6300	3.1
Copper	1030	906	12.0
Lead	53.0	50.8	4.2
Nickel	1020	891	12.6
Silver	6000	6152	2.5
Thallium	25.0	25.2	0.8
Zinc	1010	910	9.9

# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined		
Parameter	Laboratory No. 86-		(mg/kg)			
Petroleum Hydrocarbon	6265*	29	2200	2030	91.0	
Oil and Grease	6236 6246	<100 <100	4520 4460	4990 5120	110 115	

<sup>\*</sup>This represents 10% QC. This is not one of your samples but was analyzed in the same batch as your samples.

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

		(mg	g/kg)	Relative
Parameter	E&E Laboratory No.86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Solids	6234 6242	92 92	92 92	0
Flashpoint	6273*	>140	>140	
Antimony	6233	<b>&lt;15</b>	<15	
Beryllium	6233	<1	<1	
Cadmium	6233	<0.5	<0.5	
Chromium	6233	<5	<5	
Copper	6233	2.12	<2	
Lead	6233	2.90	3.04	4.7
Nickel	6233	<10	<10	
Silver	6233	<4	<4	
Thallium	6233	<20	<20	
Zine	6233	7.69	7.77	1.0

<sup>\*</sup>This represents 10% QC. This is not one of your samples but was analyzed in the same batch as your samples.



### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF EP TOXICITY EXTRACTS

U-3854.38

		(m	g/L)	Relative
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Arsenic	6253	<0.5	<0.5	
Barium	6253	<5	<5	
Cadmium	6253	<0.1	<0.1	
Chromium	6253	<0.5	<0.5	
Lead	6253	<0.5	<0.5	
Mercury	6253	<0.0008	<0.0008	
Selenium	6253	<0.5	<0.5	
Silver	6253	<0.5	<0.5	
				1



# SAMPLE IDENTIFICATION CROSS-REFERENCE

U-3825

Laboratory Number 86-	Field Number	Field Location
6043	9075	0165-S0-004-GS-86-9075
6044	9076	0165-S0-004-GS-86-9076
6045	9077	0165-S0-004-GS-86-9077
6046	9078	0165-S0-004-GS-86-9078
6047	9081	0165-S0-004-GS-86-9081
6048	9082	0165-S0-004-GS-86-9082
6049	9083	0165-S0-004-GS-86-9083
6050	9142	0165-S0-004-GS-86-9142
6051	9168	0165-S0-004-GS-86-9168
6052	9167	0165-S0-004-GS-86-9167

# SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3825.1

1998 - 1888 - 1888 - 1888 - 1888 - 1888 - 1888 - 1888 - 1888 - 1888 - 1888 - 1888 - 1888 - 1888 - 1888 - 1888 -2

				PAH (7/S + 30)	5 + 30)		,	BNA(7/E + 40)	+ 40)							
<u>-</u>	o Comos	Semole	Extraction	ction	Analysis	yeis	Extraction	tion	Anelysis	/8i8	TDS (7)	3	046	)&G(28)	Pet. HC(28)	(C(28)
2	Number	Date	Dead	Dead Extr Dead Anal	Dead	Anal	Dead	Extr	Dead	Anal	Deed Extr Deed Anel Deed Anel		Dead Anal	Anal	Dead Anal	Anal
1-3825	6043	8/1	;	;	;	;	;	:	1	:	:	1	8/29	8/5	1	:
	6044	8/1	1	ł	ł	1	1	;	;	;	;	;	8/29	8/2	ì	. 1
	6045	8/1	1	1	!	-	;	. 1	!	ŀ	1	;	8/29	8/2	1	1
	9009	8/1	1	1	1	1	-	!	1	;	1	ł	8/29	8/5	1	;
	6047	1/8	;	!	!	1	1	1	ł	1	1	1	8/59	8/2	ŀ	1
	6048	1/8	1	ļ.	;	;	;	1	;	į	<u> </u>	1	8/29	8/2	1	1
	6049	8/1	;	ŀ	1	1	1	1	;	1	1	1	8/29	8/2	ł	¦
	6050	8/1	1	:	:	-		-	-	1	;	!	8/29	8/8	;	1

DEAD:
EXTR:
ANAL:
( ):
S+#:
E+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding Time.
Holding time expiration based on sample date.
Holding time expiration based on extraction date.

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SAMPLE TRACKING OF ... ANALYSES REQUIRING HOLDING TIMES

43

		_	_,				_	_	_	_			7	
•	Analvaia		Anel		<u> </u>	;	1	1	;	<u> </u>	!	!		
£ 30)	Anal		Dead Anal		;	;	;	ţ	!	;	1	;		
Phenols(7/E+30)	4		Dead Extr		:	1	!	i	;	;	·	·	7	
튑	4000 475	CXCI	Dead		;	;	;	;	;	;	;	1	1	
			Anal		8/7	6/7	8/7	8/7	8/1	8/7	8/1	8/7	1	
7/5+14)		Analyara	Dead Anal		8/15	8/15	8/15	8/15	8/15	8/15	8/15	8/15		
Organophos (7/5+14)		110	4		9/8	8/6	9/8	9/8	9/8	9/8	8/6	9/8		
Orga		Extraction	Dead Fybr		8/8	2 6	2 6	ο α 3 α	0 0	2 6	) d	8 6		
		818/	-	Dead Anat	6/8	, r	2 6	òà	, ,	, ,	, r	8,7		
/E+40)		Analysis	1		21,0	2/12	2 2 2	2/2	2/ /2	0,15	2/15	9/15	:	
Pest/PCB(7/E+40)		tion		ž		0 :	9 9	) )	9 %	9 0	0 \	9 6	, }	
Pes	<u>:</u>	Extraction		De ad	-	200	8/8	æ (	£ (2)	8 /8 8 /8	8/8	9 °	 3	
		818		ead Anal		8/8	8/8	8/8	8/8	8/8	8/8	8/8	 ò	
(gr. 1		Analysis		Dead		9/6	9/6	9/6	9/6	9/6	9/6	9/6	0 %	
,	Herb( // c+2	4100		Extr		6/7	8/7	8/7	8/7	8/7	8/7	8/7	/ <sub>8</sub>	
		Extraction		Dead		8/8	8/8	8/8	8/8	8/8	8/8	8/8	8/8	1
			 <u>≥</u>	Anal		8/5	8/5	8/5	8/5	8/5	8/5.6	8/5,6	8,5,8	
		/ 40%	121	Dead								8/15		1
	_		0 000	Date		- (/8	- 6	- ~	- <del>-</del>	· ~	, <del>,</del>		8/1	
	_		,	Sample	NOMBORI	1407	7,00	500	2400	2,00	700	6049	6050	
				a R		100	7875							

Date semple holding time expires.

Date semple was extracted.

Date semple was analyzed.

Holding time expires.

Holding time based on sample date.

Holding time based on sample extraction.

DEAD: EXTR: ANAL: ( ): S+#:

H-227



### LABORATORY REPORT

FOR

### REESE AIR FORCE BASE

U-3825.3

Job No.: U-3825			RE:	DF - 20	00	
Sample Date: 8/1/86			P.O. No.:			
Date Received: 8/2/86	,		Sampled 8	y: E&E	, Inc.	
Sample Type: Soil			Delivered	By: Feder	al Express	
E & E Lab. No. 86-	6043	6044	6045	6046	6047	6048
Customer No.	9075	9076	9077	9078	9081	9082
Sampl⇔ Identity						
	Results i	in: mg/kg a	s received	<b></b>		
Oil and Grease Antimony Beryllium Cadmium Chromium Copper Lead Nickel Silver Thallium Zinc Solids, %	<100 <15 <1 <0.5 12.9 7.03 6.56 <10 <4 <20 30.1 93	<100 <15 <1 <0.5 7.96 4.11 3.84 <10 <4 <20 18.7 92	<100 <15 <1 <0.5 7.55 2.90 5.27 <10 <4 <20 14.7	<100 <15 <1 <0.5 13.1 7.99 7.80 12.1 <4 <20 33.8 94	<100 <15 <1 <0.5 8.72 4.83 4.25 <10 <4 <20 21.9 92	<100 <15 <1 <0.5 5.50 4.35 4.08 <10 <4 <20 19.5 88

### Analytical References:

Test Methods for Evaluating Solid Waste U.S. EPA. 1982.			
0.3. LFA, 1702.	Supervising Analyst:	Say	Hamilkas

\_ .

Date:



### LABORATORY REPORT

FOR

REESE AIR FORCE BASE

U-3825.4

Job No.: U-3825			RE:	DF-2000
Sample Date: 8/1/86			P.O. No.:	
Date Received: 8/2/86	,		Sampled 8	y: E & E, Inc.
Sample Type: Soil			Delivered	By: Federal Express
E & E Lab. No. 86-	6049	6050	Blank*	
Customer No.	9083	9142		
Sample Identity				
	Results i	n: mg/kg a	s received	
Oil and Grease Antimony Beryllium Cadmium Chromium Copper Lead Nickel Silver Thallium Zinc Solids, %	<100 <15 <1 <0.5 <5 <2 1.77 <10 <4 <20 8.29 76	<100 <15 <1 <0.5 <5 <2 2.57 <10 <4 <20 8.49 92	NA <0.15 <0.01 <0.005 <0.05 <0.02 <0.005 <0.1 <0.04 <0.20 <0.05 NA	

Not applicable.

### Analytical References:

"Test	Methods	for	Evaluating	Solid	Waste,	Physical/	Chemical	Methods,"	SW-846,	Second
Edit:	ion, U.S.	EPA	, 1982.							., ,

Supervising Analyst: My/ah//

mg/L Elevated detection limits due to matrix interferences.

# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

U-3825.5

	E & E Lab. No. 86-	Blank	Blank	6043	6044	6045
Compound	Sample Identity	8/5/86	8/5/86	9075	9076	9077
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene		<250	<250	<250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250

	E & E Lab. No. 86-	6046	6047	6048	6049	6050
Compound	Sample Identity	9078	9081	9082	9083	9142
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlarobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene		<250	<250	<250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250

# QUALITY CONTROL 139 ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E & E	Original Value	Amount Added	Amount Determined	
Compound	Laboratory No. 86-		(ug/kg)		Percent Recovery
1,2-dichlorobenzene	6050	<500	1250	1237	99
1,3-dichlorobenzene	6050	<500	1250	1174	94
1,4-dichlorobenzene	6050	<500	1250	1198	96
toluene	6050	<250	1250	1144	92
ethyl benzene	6050	<250	1250	1150	92

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg as received)

U-3825.7

	E & E Lab. No. 86-	BLANK	BLANK	BLANK	BLANK	6043	6044
Compound	Sample Identity	8/5/86	8/5/86	8/5/86	8/6/86	9075	9076
carbon tetrachloride		<250	<250	<250	<250	<250	<250
1,2-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,1-trichloroethane		<250	<250	<250	<250	<250	<250
1,1-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,2-trichloroethane	,	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloroet	hane	<250	<250	<250	<250	<250	<250
chloroethane		<500	<500	<500	<500	<500	<500
2-chloroethylvinyl et	her	<5000	<5000	<5000	<5000	<5000	<5000
chloroform		<250	<250	<250	<250	<250	<250
1,1-dichloroethene		<100	< 100	<100	<100	<100	<100
trans-1,2-dichloroeth	ene	<100	<100	<100	<100	<100	<100
1,2-dichloropropane		<1000	<1000	<1000	< 1000	<1000	<1000
trans-1,3-dichloropro	pene	<1000	<1000	<1000	<1000	<1000	<1000
cis-1,3-dichloroprope	ne	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride		<u>110</u>	210	96	<50	<50	<50
chloromethane		<500	<500	<500	<500	<500	<500
bromomethane		<500	<500	<500	<500	<500	<500
bromoform		<1000	<1000	<1000	<1000	<1000	<1000
bromodichloromethane		<250	<250	<250	<250	<250	<250
fluorotrichloromethan	e	<500	<500	<500	<500	<500	<500
dichlorodifluorometha	ine	<500	<500	<500	<500	<500	<500
chlorodibromomethane		<250	<250	<250	<250	<250	<250
tetrachloroethene		<250	<250	<250	<250	<250	<250
trichloroethene		<250	<250	<250	<250	<250	<250
vinyl chloride		<500	<500	<500	<500	<500	<500

NOTE: Due to low level artifacts present in the methanol used for internal standards preparation and sample extraction, all samples may have been subtracted. The actual value of the blank has been reported.



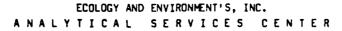
# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

# RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg, as received)

U-3825.8

	E & E Lab. No. 86~	6045	6046	6047	6048	6049	6050
Compound	Sample Identity	9077	9078	9081	9082	9083	9142
carbon tetrachlorid	e .	<250	<250	<250	<250	<250	<250
1,2-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,1-trichloroetha	ne	<250	<250	<250	<250	<250	<250
1,1-dichloroethane	ļ	<100	<100	<100	< 100	<100	<100
1,1,2-trichloroetha	ne	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloro	ethane	<250	<250	<250	<250	<250	<250
chloroethane		<500	<500	<500	<500	<500	<500
2-chloroethylvinyl	ether	<5000	<5000	<5000	<5000	<5000	<500
chloroform	j	<250	<250	<250	<250	<250	<250
1,1-dichloroethene		<100	<100	<100	<100	<100	<100
trans-1,2-dichloroe	thene	<100	<100	. <100	< 100	<100	<100
1,2-dichloropropene		<1000	<1000	<1000	<1000	<1000	< 100
trans-1,3-dichlorop	ropene	<1000	<1000	<1000	<1000	<1000	<100
cis-1,3-dichloropro	pene	<1000	<1000	<1000	< 1000	<1000	<100
methylene chloride		<50	<50	<50	<50	<50	<50
chloromethane		<500	<500	<500	<500	<500	<500
bromomethane		<500	<500	<500	<500	<500	<500
bromoform		<1000	<1000	<1000	<1000	<1000	<100
bromodichloromethan	e	<250	<250	<250°	<250	<250	<250
fluoratrichlorometh	ane	<500	<500	<500	<500	<500	<500
dichlorodifluoromet	hane	<500	<500	<500	<500	<500	<500
chloradibromomethan	e	<250	<250	<250	<250	<250	<250
tetrachloroethene		<250	<250	<250	<250	<250	<250
trichloroethene		<250	<250	<250	<250	<250	<250
vinyl chloride		<500	<500	<500	<500	<500	<500

NOTE: Due to low level artifacts present in the methanol used for internal standards preparation and sample extraction, all samples have been blank subtracted. The actual value of the blank has been reported.



# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PESTICIDES, PCBs AND HERBICIDES BY GC (all results in mg/kg)

	E&ELab. No.86-	BLANK	6043	6044	6045	6046	6047	6048
Compaund	Sample Identity	8/6/86	9075	9076	9077	9078	9081	7082
Aldrin		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
a-BHC		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
b-BHC		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
g-BHC	ļ	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
d_BHC		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlordane		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4,4'-DDD		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4,4'-DDE		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4,4'-DDT		<1.0	<1.0	<1.8	<1.0	<1.0	<1.0	<1.0
Dieldrin		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Endosulfan I		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Endosulfan II		<1.0	<1.D	<1.0	<1.0	<1.0	<1.0	<1.0
Endosulfan sulfate		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Endrin		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Endrin aldehyde		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Heptachlor		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Heptachlor epoxide		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1016	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1221	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1232	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1242		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1248		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1254		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB - 1260		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toxaphene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2.4-D		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,3,5-TP (Silvex)		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,5,-T		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0



### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PESTICIDES, PCBs AND HERBICIDES BY GC (all results in mg/kg)

		· · · · · · · · · · · · · · · · · · ·	<b></b>			<b></b>	\- <u></u>	U-3825.10
	E&ELab. No.86-	6049	6050					
Compound	Sample Identity	9083	9142					
Aldrin		<1.0	<1.0					
a-BHC		<1.0	<1.0					}
b-BHC		<1.0	<1.0					[
g-BHC		<1.0	<1.0	<b>\</b>				1
d-8HC		<1.0	<1.0					[
Chlordane		<1.0	<1.0					(
4,4'-DDO		<1.0	<1.0					ĺ
4,4'-DDE .	•	<1.0	<1.0					[
_' 4,4'-DOT		<1.0	<1.0					}
Dieldrin		<1.0	<1.0					[
Endosulfan I		<1.0	<1.0					
Endosulfan II		<1.0	<1.0					
Endosulfan sulfate		<1.0	<1.0					
Endrin		<1.0	<1.0					
Endrin aldehyde	•	<1.0	<1.0					
Heptachlor	I	<1.0	<1.0	ĺ				
Heptachlor epoxide		<1.0	<1.0					
PCB - 1016		<1.0	<1.0					
PCB - 1221		<1.0	<1.0		i			
PCB - 1232		<1.0	<1.0					
PCB - 1242	:	<1.0	<1.0					
PCB - 1248		<1.0	<1.0					
PCB - 1254		<1.0	<1.0	ļ				
PCB - 1260		<1.0	<1.0	]	'			
Toxaphene		<1.0	<1.0		,			
2.4-D		<1.0	<1.0					
2,3,5-TP (Silvex)		<1.0	<1.0	]				
2,4,5,-T		<1.0	<1.0					
L			L	L				l



### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

	E&E	(mg	Relative	
Compound	Laboratory No. 86- 6046	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Aldrin		<1.0	<1.0	_
a-BHC	ļ	<1.0	<1.0	-
b_BHC	)	<1.0	<1.8	-
g-BHC	1	<1.0	<1.0	-
d-BHC		<1.0	<1.0	-
Chlordane	<u> </u>	<1.0	<1.0	_
4,4'-DDD		<1.0	<1.0	-
4,4'-DDE		<1.0	<1.0	-
4,4'-DDT	İ	<1.0	<1.0	-
Dieldrin	1	<1.0	<1.0	i -
Endosulfan I	ŀ	<1.0	<1.0	{ -
Endosulfan II		<1.0	<1.0	-
Endosulfan sulfate		<1.0	<1.0	1 -
Endrin		<1.0	<1.0	-
Endrin aldehyde		<1.0	<1.0	-
Heptschlor		<1.0	<1.0	<b>i</b> -
Heptachlor epoxide	1	<1.0	<1.0	-
PCB - 1016		<1.0	<1.0	-
PCB - 1221		<1.0	<1.0	<b>i</b> -
PCB - 1232		<1.0	<1.0	-
PCB - 1242		<1.0	<1.0	-
PCB - 1248		<1.0	<1.0	-
PCB - 1254		<1.0	<1.0	-
PCB - 1260		<1.0	<1.0	-
Tox aphene		<1.0	<1.0	-
2,4-0		<1.0	<1.0	-
2,4,5-TP (Silvex)		<1.0	<1.0	j -
2,4,5-T	Į.	<1.0	<1.0	1 -

# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86-		Percent Recovery		
2,4-D	6046	<1.0	4.0	4.3	108
Silvex	6046	<1.0	4.0	3.1	78
Diazinon	6046	<1.0	21.1	21.4	101
		<u> </u> 			



### LABORATORY REPORT

### FOR

### REESE AIR FORCE BASE

U-3825.13

Job No.: U-3825			RE		DF-200	10	
Sample Date: 8/1/86	<del></del> 5		P.(	P.O. No.:			
Date Received: 8/2/86				pled By:	E&E,	Inc.	
Sample Type: Soil	De	livered By	: Federa	ıl Express			
RESULTS OF CHEMICA	AL ANALYSI	S OF EXTR	ACTS FROM	1 EP TOXIO	ITY TESTS	AND IGNI	TABILITY
	mg/L						Maximum Allowable Concen- tration (mg/L)
E & E Lab. No. 86-	6051	6052	BLANK				
Customer No.	9168	9167					
Sample Identity							
Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Endrin Lindane Methoxychlor Toxaphene 2,4-D 2,4,5-TP (Silvex) Ignitability, °F	CO.5 CO.1 CO.5 CO.5 CO.5 CO.5 CO.5 NR NR NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.5 <0.5 <0.5 NR NR NR NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.5 <0.5 <0.5 NR NR NR NR NR NR NR				5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.02 0.4 10.0 0.5 10.0

NA: Not Applicable

NR: Analysis not requested

### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1782.

Supervising Analyst:

Cu

H-238





# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

# RESULTS OF SOIL ANALYSIS FOR ORGANOPHOSPHOROUS PESTICIDES BY GC

(all results in ug/g)

	E & E Lab. No. 86-	BLANK	6043	6044	6045	6046	6047	6048
Compound	Sample Identity	8/6/86	9075	9076	9077	9078	9081	90.82
Naled		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Phorate		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Disulfoton		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.8
Chlorpyrifos		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dimethoate		<1.0	<1.0	<1.0	<1.0	_ <1 <b>.</b> 0	<1.0	<1.0
Malathion		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Mevinphas		<1.0	<1.0	<1.0	<1.0	<1.0	₹1.0	<1.0
Parathion		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl parathion		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Diazinon		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl azinphos		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0



# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R



# RESULTS OF SOIL ANALYSIS FOR ORGANOPHOSPHOROUS PESTICIDES BY GC

(all results in ug/g)

	E & E Lab. No. 86-	6049	6050				
Compound	Sample Identity	9083	9142				
Naled		<1.0	<1.0				
Phorate		<1.0	<1.0			·	
Disulfoton	1	<1.0	<1.0			į	
Chlorpyrifos	ĺ	<1.0	<1.0				
Dimethoate		<1.0	<1.0				
Malathion		<1.0	<1.0				
Mev inphos		<1.0	<1.0				
Parathion		<1.0	<1.0				
Methyl perathion		<1.0	<1.0		l		
Diazinon	į	<1.0	<1.0	!			
Methyl azinphos	İ	<1.0	<1.0				

### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

U-3825.16

	E&E	( u	g/g)	Relative	
Perameter	Laboratory No. 86- 6046	Original Analysis	Replicate Analysis	Percent Difference (RPD)	
Naled		<1.0	<1.0	-	
Phorate		<1.0	<1.0	_	
Disulfoton		<1.0	<1.0	-	
Chlorpyrifos		<1.0	<1.0	-	
Dimethoate		<1.0	<1.0	-	
Malathion		<1.0	<10	-	
Mevinphos		<1.0	<1.0	-	
Parathion		<1.0	<1.0	-	
Methyl parathion		<1.0	<1.0	-	
Diazinon		<1.0	<1.0	-	
Methyl azinphos		<1.0	<1.0	_	

# QUALITY CONTROL FOR ACCURACY: PERCENT DIFFERENCE--EPA QUALITY ASSURANCE MATERIALS

	Concentrat		
Parameter	Known	Determined	Percent Difference
Antimony	990	1112	12.3
Beryllium	960	1006	4.8
Cadmium	940	901	4.1
Chromium	1030	986	4.3
Copper	1030	950	7.7
Lead	53.0	49.1	7.4
Nickel	1020	954	6,5
Silver	6000	6152	2.5
Thallium	25.0	24.9	<0.5
Zinc	1010	980	3.0

# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

. <del>.</del>	E & E	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86-	(		Percent Recovery	
Oil and Grease	6048	<100	3380	3780	112
Cadmium*	6050	<0.005	1.0	0.924	92.4
Chromium*	6050	<0.05	1.0	0.983	98.3
Copper*	6050	<0.02	1.0	0.944	94.4
Lead*	6050	0.013	0.025	0.040	108
Nickel*	6050	<0.1	1.0	0.905	90.5
Zinc*	6050	0.086	1.0	1,02	93.4

<sup>\*</sup> Results in mg/L because spiking is performed during digestion procedure.

### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

U-3825.19

		(mg	Relative	
Perameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Solids, %	6048	88	89	1.1
Flashpoint	6173*	>140	>140	
Cadmitm	6050	<0.5	<0.5	
Chromium	6050	<5	<5	
Copper	6050	<2	<2	
Lead	6050	2.57	3,00	15.4
Nickel	6050	<10	<10	
Zinc	6050	8.49	7.34	14.5

<sup>\*</sup> This represents 10% QC. This is not one of your samples but was analyzed in the same batch as your samples.

Record Services Consisted Services and Consisted Services Services Services Services Services Interested National

# SAMPLE IDENTIFICATION CROSS-REFERENCE

U-3826

Laboratory Number 86-	Field Number	Field Location
6053	9079	0165-S0-004-GS-86-9079
6054	9080	0165-S0-004-GS-86-9080
6055	9090	0165-S0-005-GS-86-9090
6056	9091	0165-S0-005-GS-86-9091
6057	9092	0165-S0-005-GS-86-9092
6058	9169	0165-S0-005-GS-86-9169
6059	9170	0165-S0-004-GS-86-9170

# SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3826.1

					_		 	
Pet. HC(28)	Dead Anal	ļ	;	;	1	;		
Pet.	Dead	;	;	;	ŀ	1		
(82)	Anal	9/8	9/8	<u> </u>	1	1	 	
04G(28)	Dead Anal	8/30	8/30	;	ì	;	 	
10S (7)	Anal	1	1	;	;	;		
105	Dead Anal	;	1	1	1	;		
YSIS	Anal	1	1	9/8	9/8	8/5	 	-
E + 40) Analysis	Dead	;	!	9/14	9/14	9/14	 	
BNA(14/E + 40) Extraction Anali	Dead Extr Dead Anal	i	!	8/2	8/5	8/2	 	
Extrac	Dead	;	1	8/16	8/16	8/16		
818	Anal	;	!	!	!	-	 	
5 + 30) Analysis	Dead	;	!	;	-	<u> </u>	 	
PAH (7/S + 30) Extraction Anal	Dead Extr Dead Anal	1	!	;	-	;	 _	
Extra	Dead	{		;	1	{		
	Sample Date	8/2	8/2	8/2	8/2	8/2		
	Sample Number	6053	6054	6055	9509	6057		
	gor	U-3826						

DEAD:
EXTR:
ANAL:
( ):
S+#:
E+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time.
Holding time expiration based on sample date.
Holding time expiration based on extraction date.

# SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3826.2

											_
	818	Anal		;	!	;	;	;			
/E+30)	Analysis	Dead, Extr. Dead, Anal	;	;	-	!	1	:			
Phenols(7/E+30)	Extraction	Extr	;	;	1	1	<u>ا</u>	1			
£1	Extra		;	;	!	1		1			
<b>3</b> 1	Analysis	Anal	L	8/1		\ 	1	;			
Organophos(7/5+14)	Ana	Dead Extr. Dead Anal	91/8	8/16	1	}	1	1			
enophos	Extraction	Extr	9/8	9/8	. 1	;	1	1			
Org.	Extra	Dead	6/8	6/8	. 1	1	;	;			
	увів	Dead, Extr. Dead, Anal	8/12	8/12	.	;	ł				
Pest/PCB(7/E+40)	Analysis	Оевд	6/6	9/2		ŀ	1				
st/PCB(	Extraction	Extr	9/8	9/8	1	;	1				
e)	Extre		6/8	6/8	<u></u>	1	1				
	ysis	Dead Anal	8/8	8/8	-	;	1				
Herb(7/E+30)	Analysis	Dead	9/6	9/6	1	;	1				
Herb(7	Extraction	Extr	7/8	8/7	;	;	;				
	Extre	Dead Extr	6/8	8/8	;	1	1				
	VOA(14)	Dead Anal	•			9/8					
	<u>Ş</u>	Dead	8/16	9/16	8/16	8/16	8/16				
	Samole	Oute	8/2	8/2	8/2	8/2	8/2				
	Samole	Number	6053	6054	\$<09	9509	6057	_			
	Job		U-3826						H-,	247	,

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time expires
Holding time based on sample date.
Holding time based on sample extraction. DEAD: EXTR: ANAL: ( ): S+#:



### LABORATORY REPORT

FOR REESE AIR FORCE BASE

U-3826.3

		f				
Job No.: U-382	6	•	RE:	<b>DF-2</b> 0	00	
Sample Date: 8/2/8	6		P.O. No.:			
Date Received: 8/4/8	6		Sampled B	y: E&E	, Inc.	
Sample Type: Soil			Delivered	By: Feder	al Express	
E & E Lab. No. 86-	6053	6054	6055	6056	6057	B] ank*
Field Number	9079	9080	9090	9091	9092	
Sample Identity						
	Results i	n: mg/kg e	s received	unless note	ed	
Oil and Grease Antimony Beryllium Cadmium Chromium Copper Lead Nickel Silver Thallium Zinc Solids, %	<100 <15 <1 <0.5 6.81 5.37 4.38 <10 <4 <20 17.4 90	<100 <15 <1 <0.5 5.94 3.16 3.25 <10 <4 <20 13.5 91	NR NR NR <0.5 <5 NR 3.72 <10 NR NR 9.69	NR NR NR <0.5 7.9 NR 5.60 <10 NR NR 16.1 78	NR NR NR <0.5 <5 NR 4.11 <10 NR NR 9.05	NA <0.15 <0.01 <0.005 <0.05 <0.02 0.013 <0.1 <0.04 <0.20 <0.05 NA

NR: Analysis not requested NA: Not applicable \*mg/L

tElevated detection limit due to matrix interference.

### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Date:

Supervising Analyst: >

# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

# RESULTS OF SOIL ANALYSIS FOR ORGANOPHOSPHOROUS PESTICIDES BY GC

(all results in ug/g, as received)

	E & E Lab. No. 86-	6053	6054	B1 ank			
Compound	Sample Identity	9079	9080	8/6/86			
Naled		<1.0	<1.0	<1.0			
Phorate		<1.0	<1.0	<1.0			
Disulfoton		<1.0	<1.0	<1.0			:
Chlorpyrifos		<1.0	<1.0	<1.0			
Dimethoate		<1.0	<1.0	<1.0		,	
Malathion		<1.0	<1.0	<1.0			
Mevinphos		<1.0	<1.0	<1.0			
Parathion		<1.0	<1.0	<1.0			
Methyl parathion		<1.0	<1.0	<1.0			
·Diazinon		<1.0	<1.0	<1.0			
Methyl azinphos		<1.0	<1.0	<1.0	:		



RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg, as received)

	E & E Lab. No. 86-	Blank	6053	<b>6</b> 054	6055	6056	6057
Compound	Sample Identity	8/6/86	9079	9080	9090	9091	9092
carbon tetrachlorid		<250	<250	<250	<250	<250	<250
1,2-dichloroethane	[	<100	<100	<100	<100	<100	<100
1,1,1-trichloroether	ne l	<250	<250	<250	<250	<250	<250
1,1-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,2-trichloroether	ne l	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloro	ethane	<250	<250	<250	<250	<250	<250
chloroethane	[	<500	<500	<500	<500	<500	<500
2-chloroethylvinyl	ether	<5000	<5000	<5000	<5000	<5000	<5000
chloroform		<250	<250	<250	<250	<250	<250
1,1-dichloroethene		<100	<100	<100	<100	<100	<100
trans-1,2-dichloroe	thene	<100	<100	<100	<100	<100	<100
1,2-dichloropropane		<1000	<1000	<1000	<1000	<1000	<1000
trans-1,3-dichlorops	ropene	<1000	<1000	<1000	<1000	<1000	<1000
cis-1,3-dichloroprop	pene	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride		<50	<50	<50	<50	<50	<50
chloromethane		<500	<500	<500	<500	<500	<500
bromomethane		<500	<500	<500	<500	<500	<500
bromoform		<1000	<1000	<1000	<1000	<1000	<1000
bromodichloromethan	•	<250	<250	<250	<250	<250	<250
fluorotrichlorometh	ane (	<500	<500	<500	<500	<50 <b>0</b>	<500
dichlorodifluoromet	nane	<500	<500	<500	<500	<500	<500
chlorodibromomethan	•	<250	<250	<250	<250	<250	<250
tetrachloroethene	į	<250	<250	<250	<250	<250	<250
trichloroethene		<250	<250	<250	<250	<250	<250
vinyl chloride		<500	<500	<500	<500	<500	<500

### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

		(ug/	'kg)	Relative
Compound	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
carbon tetrachloride	6057	<250	<250	
1,2-dichloroethane	6057	<100	<100	
1,1,1-trichloroethane	6057	<250	<250	
1,1-dichloroethane	6057	<100	<100	
1,1,2-trichloroethane	6057	<500	<500	ļ <u></u>
1,1,2,2-tetrachloroethane	6057	<250	<250	
chloroethane	6057	<500	<500	
2-chloroethylvinyl ether	6057	<5000	<5000	i
chloroform	6057	<250	<250	
1,1-dichloroethene	6057	<100	<100	l
trans-1,2-dichloroethene	6057	<100	<100	
1,2-dichloropropane	6057	<1000	<1000	
trans-1,3-dichloropropene	6057	<1000	<1000	
cis-1,3-dichloropropene	6057	<1000	<1000	
methylene chloride	6057	<50	<50	
chloromethane	6057	<500	<500	
bromomethane	6057	<500	<500	
bromoform	6057	<1000	<1000	·
bromodichloromethane	6057	<250	<250	
fluorotrichloromethane	6057	<500	<500	
dichlorodifluoromethane	6057	<500	<50 <b>0</b>	
chlorodibromomethane	6057	<250	<250	
tetrachloroethene	6057	<250	<250	
trichloroethene	6057	<250	<250	
vinyl chloride	6057	<500	<500	

# ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E & E Lab. No. 86-	Blank	6053	6054	6055	6056
Compound	Sample Identity	8/6/86	9079	9080	9090	9091
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene		<250	<250	<250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250



# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E & E Lab. No. 86-	6057		
Compound	Sample Identity	9092		
chlorobenzene		<250		
1,2-dichlorobenzene		<500		
1,3-dichlorobenzene		<500		
1,4-dichlorobenzene		<500		
benzene		<250		
total xylenes		<500		
taluene		<250	,	
ethylbenzene		<250		

R	QUALITY CONTROL I ESULTS OF ANALYS ANALYSES OF SI	FOR PRECISION IS OF REPLICA DIL SAMPLES	N NTE		
				U-3826.9	
	FAF	(ug	g/kg)	Relative	
Parameter  chlorobenzene 1,2-dichlorobenzene 1,3-dichlorobenzene 1,4-dichlorobenzene benzene total xylenes toluene ethyl benzene	Laboratory No. 86- 6057	Original Analysis	Replicate Analysis	Percent Difference (RPD)	
chlorobenzene		<250	<250		
1,2-dichlorobenzene	[	<500	<500		
1,3-dichlorobenzene		<500	<500		
1,4-dichlorobenzene		<500	<500		
benzene		<250	<250		
total xylenes		<500	<500		
toluene		<250	<250		
ethyl benzene		<250	<250		
		H-254			



### LABORATORY REPORT

FOR

### REESE AIR FORCE BASE

U-3826.10

Job No.: U-382	6		RE		DF-200	0	
Sample Date: 8/2/8	6		P.(	). No.:			
Date Received: 8/4/8	6		San	npled By:	E&E,	Inc.	
Sample Type: Soil			Del	ivered By	: Federa	l Express	<b>,</b>
RESULTS OF CHEMICAL	ANALYSIS OF	F EXTRACT:	S FROM EF	TOXICITY	TESTS &	IGNITABIL	ITY
			mç	<sub>1</sub> /L			Maximum Allowable Concen- tration (mg/L)
E&ELab. No. 86-	6058	6059	Blank				
Customer No.	9169	9170					
Sample Identity						_	
Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Endrin Lindane Methoxychlor Toxaphene 2,4-D	<0.5 <5.0 <0.1 <0.5 <0.05 <0.0008 <0.5 <0.5 NR NR NR NR	<0.5 <0.5 NR NR NR NR NR	<0.5 <0.5 NR NR NR NR				5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.02 0.4 10.0 0.5
2,4,5-TP (Silvex) Ignitability, °F	NR >140	NR >140	NR NA				1.0

NA: Not applicable NR: Analysis not requested

### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

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### ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER



# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PESTICIDES, PCBB AND HERBICIDES BY GC

		FC	DI DOV AND E	NIVIDONALENTIS 1	NC. CENTER	
	A	NALYI	ICAL S	ERVICES	CENTER	
		01	cente ne e	DIL ANALYCIC FO	<b>.</b>	
	PRIOR	ITY POLLUT	ANT PESTICI	DIL ANALYSIS FO DES, PCBs AND HI	RBICIDES BY GC	
		(911	results In	ug/g, as receiv	veg)	
	E & E Lab.					<del></del>
	No. 86-	6053	6054	Blank		
Sanara = 1	Sample	00.70	00.00	0///2/		
Compound	Identity	9079	9080	8/6/86		
Aldrin		<1.0	<1.0	<1.0		
a-BHC		<1.0	<1.0	<1.0		
b-8HC		<1.0	<1.0	<1.0		
g-BHC		<1 · 0	<1.0	<1.0		
d-BHC		<1.0	<1.0	<1.0		
Chlordane		<1.0	<1.0	<1.0		
4,4'-DDD		<1.0	<1.0	<1.0		
4,4'-DDE		<1.0	<1.0	<1.0		
4,4'-DDT Dieldrin		<1.0 <1.0	<1.0	<1.0		
Endosulfan I		<1.0	<1.0 <1.0	<1.0		
Endosulfan II		<1.0	1	<1.0		
Endosulfan sulfate		<1.0	<1.0 <1.0	<1.0 <1.0		
Endrin		<1.0	<1.0	<1.0		
Endrin aldehyde		<1.0	<1.0	<1.0		
Heptachlor		<1.0	<1.0	<1.0		
Heptachlor epoxide		<1.0	<1.0	<1.0		
PCB - 1016		<1.0	<1.0	<1.0		
PCB - 1221		<1.0	<1.0	<1.0		
PCB - 1232		<1.0	<1.0	<1.0		
PCB - 1242		<1.0	<1.0	<1.0		
PCB - 1248		<1.0	<1.0	<1.0		
PCB - 1254		<1.0	<1.0	<1.0		
PCB - 1260		<1.0	<1.0	<1.0		
Toxaphene	•	<1.0	<1.0	<1.0		
2,4-D		<1.0	<1.0	<1.0		
2,4,5-TP (Silvex)		<1.0	<1.0	<1.0		





# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E Laboratory No. 86-	Original Value	Amount Added	Amount Determined	Parant
Parameter	6054		Percent Recovery		
Aldrin a-BHC b-BHC g-BHC		<1 <1 <1 <1	2.0 2.0 2.0 2.0	1.76 1.89 1.99 1.94	88.2 94.6 99.7 96.8
d-BHC 4,4'-DDT		<1 <1	2.0 2.0	1.99 1.57	99.6 78.5
Endosulfan sulfate Endrin Endrin aldehyde		<1 <1 <1	2.0 2.0 2.0	2.72 2.02 1.70	136 101 84.9
Heptachlor Heptachlor epoxide		<1 <1	2.0	2.14 1.84	107 92.2
					:
L	L				



### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

### RESULTS OF SOILS ANALYSIS FOR PRIORITY POLLUTANT BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

E & E Lab. No. 86- 6055 6056	6057 9092 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1	Method 81 ank ug/L <10 <10 <10 <10 <10 <10 <10 <10 <10 <10	
Dis(2-chloroethyl)ether	(1 (1 (1 (1 (1 (1 (1 (1 (1 (1	<10 <10 <10 <10 <10 <10 <10 <10 <10 <10	
1,3-dichlorobenzene       <1       <1         1,4-dichlorobenzene       <1       <1         1,2-dichlorobenzene       <1       <1         bis(2-chloroisopropyl)ether       <1       <1         N-nitrosodipropylamine       <1       <1         hexachloroethane       <1       <1         nitrobenzene       <1       <1         isophorone       <1       <1         bis(2-chloroethoxy)methane       <1       <1	(1 (1 (1 (1 (1 (1 (1 (1 (1 (1	<10 <10 <10 <10 <10 <10 <10 <10 <10 <10	
1,3-dichlorobenzene       <1       <1         1,4-dichlorobenzene       <1       <1         1,2-dichlorobenzene       <1       <1         bis(2-chloroisopropyl)ether       <1       <1         N-nitrosodipropylamine       <1       <1         hexachloroethane       <1       <1         nitrobenzene       <1       <1         isophorone       <1       <1         bis(2-chloroethoxy)methane       <1       <1	(1 (1 (1 (1 (1 (1 (1 (1 (1 (1	<10 <10 <10 <10 <10 <10 <10 <10 <10 <10	
1,4-dichlorobenzene       <1       <1         1,2-dichlorobenzene       <1       <1         bis(2-chloroisopropyl)ether       <1       <1         N-nitrosodipropylamine       <1       <1         hexachloroethane       <1       <1         nitrobenzene       <1       <1         isophorone       <1       <1         bis(2-chloroethoxy)methane       <1       <1	(1 (1 (1 (1 (1 (1 (1 (1 (1	<10 <10 <10 <10 <10 <10 <10 <10 <10	
1,2-dichlorobenzene       <1       <1         bis(2-chloroisopropyl)ether       <1       <1         N-nitrosodipropylamine       <1       <1         hexachloroethane       <1       <1         nitrobenzene       <1       <1         isophorone       <1       <1         bis(2-chloroethoxy)methane       <1       <1	(1 (1 (1 (1 (1 (1 (1 (1 (1	<10 <10 <10 <10 <10 <10 <10 <10	
bis(2-chloroisopropyl)ether         <1         <1           N-nitrosodipropylamine         <1         <1           hexachloroethane         <1         <1           nitrobenzene         <1         <1           isophorone         <1         <1           bis(2-chloroethoxy)methane         <1         <1	<1 <1 <1 <1 <1 <1 <1 <1 <1	<10 <10 <10 <10 <10 <10 <10	
N-nitrosodipropylamine	(1 (1 (1 (1 (1 (1 (1	<10 <10 <10 <10 <10 <10	
hexachloroethane         <1         <1           nitrobenzene         <1         <1           isophorone         <1         <1           bis(2-chloroethoxy)methane         <1         <1	<1 <1 <1 <1 <1 <1 <1	<10 <10 <10 <10 <10	
nitrobenzene         <1         <1           isophorone         <1         <1           bis(2-chloroethoxy)methane         <1         <1	<1 <1 <1 <1 <1 <1	<10 <10 <10 <10	
isophorone <1 <1 bis(2-chloroethoxy)methane <1 <1	<1 <1 <1 <1 <1	<10 <10 <10	
bis(2-chloroethoxy)methane <1 <1	<1 <1 <1 <1	<10 <10	
1 1 1 1	<1 <1 <1	<10	
	<1 <1		
naphthalene <1 <1	<1	1 10	
hexachlorobut adiene <1 <1		<10	
hexachlorocyclopentadiene <1 <1	l <1	<10	
2-chloronaphthalene <1 <1	<u> </u>	<10	
dimethyl phthalate	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	<10	
acenaphthylene <1 <1	<u> </u>	<10	
fluorene <1 <1	\	<10	
acenaphthene <1 <1	\ \di	<10	
2,4-dinitrotoluene	\ \d	<10	
2,6-dinitrotoluene <1 <1	<1	<10	
diethylphthalate <1 <1	\ \ \ \ \ \ \ \	<10	
4-chlorophenyl phenyl ether	<1	<10	}
N-nitrosodiphenylamine	\ \z\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	<10	
4-bromophenyl phenyl ether	<1	<10	
hexachlorobenzene (1 (1	\ \cdot\{1}	<10	
phenanthrene <1 <1	\ \cdot\( \cdot\)	<10	
anthracene (1 (1	\ \(\delta\)	<10	
di-n-butyl phthalate	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	<10	
fluoranthene (1 (1	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	<10	
benzidine (5)	<b>(5</b>	<50	}
pyrene (1 (1	(1	<10	
butyl benzyl phthalate <1 <1	\ \\ \\ \\ \\ \	<10	
3,3'-dichlorobenzidine  \	3	<30	
benzo(a) anthracene	<1	<10	}
bis(2-ethylhexyl)phthalate	\ \cdot\(\frac{1}{3}\)	<10	}
chrysene <1 <1	<1	<10	
di-n-octyl phthelate <1 <1	<1	<10	[
benzo(b)fluoranthene <1 <1	<1	<10	}
benzo(k) fluoranthene <1 <1	<1	<10	
benzo(a)pyrene <1 <1	<1	<10	
indeno(1,2,3-cd)pyrene <1 <1	<1	<10	ŀ
dibenzo(a,h)anthracene <1 <1	<1	<10	}
benzo(ghi)perylene <1 <1	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	<10	
	]		

<sup>\*</sup>Compound present below measurable detection limit.

# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

RESULTS OF SOIL ANALYSIS FOR PHENOLS BY GC (all results in mg/kg, as received)

Compound	E & E Lab. No. 86-	6055 9090	6056 9091	6057 9092	Method Blank ug/L	
	Sample Identity					
phenol	·	<1	<1	<1	<10	
2-chlorophenol		<1	<1	<1	<10	
2-nitrophenol		<1	<1	<1	<10	
2,4-dimethylphenol		<1	<1	<1	<10	
2,4-dichlorophenol		<1	<1	<1	<10	
4-chloro-3-methylphenol		<1	<1	<1	<10	
2,4,6-trichlorophenol		<1	<1	<1	<10	
2,4-dinitrophenol		<3	<3	<3	<30	
4-nitrophenol		<1	<1	<1	<10	
4,6-dinitro-2-methylphenol		<3	<3	<3	<30	
pentachlorophenol		<3	<3	<3	<30	

<sup>\*</sup>Compound present below measurable detection limit.

### QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY OF SURROGATE SPIKES

U-3826.15

	E & E	Amount Added	Amount Determined	
Compound	Laboratory No. 86-	(111	g/kg)	Percent Recovery
Nitrobenzene-D5	6055	3.3	2.3	69.7
	6056	3.3	2.1	63.6
	6057	3.3	2.1	63.6
2-Fluorobiphenyl	6055	3.3	2.7	81.8
	6056	3.3	2.9	87.9
	6057	3.3	2.8	84.8
Terphenyl-D14	6055	3.3	2.4	72.7
	6056	3.3	2.4	72.7
	6057	3.3	2.1	63.6
Pheno1-D5	6055	6.6	2.7	40.9
	6056	6.6	1.9	28.8
	6057	6.6	2.4	36.4
2-F1uoraphena1	6055	6.6	2.3	34.8
	6056	6.6	2.5	37.9
	6057	6.6	2.6	39.4
2,4,6-Tribromophenol	6055	6.6	2.5	37.8
	6056	6.6	1.9	28.8
	6057	6.6	2.3	34.8

These recoveries are acceptable to EPA Contract Lab Program (CLP) guidelines.

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

				· · · · · · · · · · · · · · · · · · ·
	E&ELab. No. 86-	mg	/kg	Relative
Compound	6056	Original Analysis	Replicate Analysis	Percent Difference (RPD)
bis(2-chloroethyl)ether		<b>&lt;</b> 1	<b>&lt;</b> 1	
1,3-dichlorobenzene		<1	<1	
1,4-dichlorobenzene		<1	<1	
1,2-dichlorobenzene		<1	<1	
bis(2-chloroisopropyl)ether		<1	<1	
N-nitrosodipropylamine		<1	<1	
hexachloroethane		<1	<1	
nitrobenzene		<1	<b>&lt;</b> 1	
i sophorone		<1	<1	
bis(2-chloroethoxy)methane		<1	<b>&lt;</b> 1	
1,2,4-trichlorobenzene		<1	<b>&lt;</b> 1	
naphthalene		<1	<b>&lt;</b> 1	
hexachlorobutadiene		<1	<1	
hexachlorocyclopentadiene		<1	<b>&lt;</b> 1	
2-chloronaphthalene		<b>&lt;</b> 1	<1	
dimethyl phthalate		<b>&lt;</b> 1	<b>&lt;</b> 1	
acenaphthylene		` <1	<b>&lt;</b> 1	
fluorene		<1	<b>&lt;</b> 1	
acenaphthene	i	<1	<1	
2,4-dinitrotoluene		<1	<1	
2,6-dinitrotoluene		<1	<1	
diethylphthalate	:	<1	<1	
4-chlorophenyl phenyl ether	,	<1	<1	
N-nitrosodiphenylamine		<1	<1	
4-bromophenyl phenyl ether		<1	<1	
hexachlorobenzene		<1	<1	
phenanthrene		<1	<b>&lt;</b> 1	
anthracene		<1	<b>&lt;</b> 1	
di-n-butyl phthalate		<1	<1	
fluoranthene		<1	<b>&lt;</b> 1	
benzidin <del>e</del>		<5	<5	
pyrene		<1	<1	
butyl benzyl phthalate	,	<1	<1	
3,3'-dichlorobenzidine		<3	(3	
benzo(a)anthracene	'	<1	<b>&lt;</b> 1	
bis(2-ethylhexyl)phthalate		<1	<1	
chrysene		<1	<b>&lt;</b> 1	
di-n-octyl phthalate		<1	<b>&lt;</b> 1	
benzo(b)fluoranthene	•	<1	<b>&lt;</b> 1	
benzo(k)fluoranthene		<1	<1	
benzo(a)pyrene		<1	<1	
indeno(1,2,3-c,d)pyrene		<1	<1	
dibenzo(a,h)anthracene		<1	<1	
benzo(g,h,i)perylene		<1	<b>&lt;</b> 1	
L		L		

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

		т	Relative	
Compound	E & E Lab. No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
phenol		<1	<1	
2-chlorophenol		<1	<1	
2-nitrophenol		<1	<1	
2,4-dimethylphenol		<b>&lt;</b> 1	<b>&lt;</b> 1	
2,4-dichlorophenol		<1	<1	
4-chloro-3-methylphenol		<1	<1	
2,4,6-trichlorophenol		<1	<1	
2,4-dinitrophenol		(3	<b>(3</b>	
4-nitrophenol		<1	<1	
4,6-dinitra-2-methylphenol		<b>3</b>	<b>(3</b>	
pentachlorophenol		<3	<3	

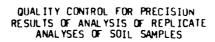
### QUALITY CONTROL FOR ACCURACY: PERCENT DIFFERENCE--EPA QUALITY ASSURANCE MATERIALS

. •	Concentrat		
Parameter `	Known	Determined	Percent Difference
Antimony	990	1112	12.3
Beryllium	960	1006	4.8
Cadmium	1300	1200	7.7
Chromium	6500	6262	3.7
Copper	1030	943	8.4
Lead	53,0	50.4	4.9
Nickel	1020	940	7.8
Silver	6000	6152	2.5
Thallium	25.0	25.2	0.8
Zine	1010 1010	1000 1040	1.0 3.0

### QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86-		(mg/kg	)	Percent Recovery
Oil and Grease	6053	<100	3840	4620	120
Lead*	6054	0.033	0.025	0.056	92.0
	}				

<sup>\*</sup>Results in mg/L because spiking done during digestion procedure.



·	- '	• .	(mg/kg)	Relative
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Solids	6054	91	91	0
Flashpoint	6173*	>140	>140	
Antimony .	6057	<15	<15	
Beryllium	6057	<1	<1	
Cadmium	6057	<0.5	<0.5	
Chromium	6057	<5	<5	
Lead	6057	4.11	4.18	1.7
Nickel	6057	<10	<10	
Silver	6057	<4	<4	
Thallium	6057	<20	<20	
Zinc	6057	9.05	7.67	16.5

<sup>\*</sup>This represents 10% QC. This is not one of your samples but was analyzed in the same batch as your samples.



### SAMPLE IDENTIFICATION CROSS-REFERENCE

Field Number	Field Location
9027	0165-S0-002-GS-86-9027
9028	0165-S0-002-GS-86-9028
9049	0165-S0-006-GS-86-9049
9050	0165-S0-006-GS-86-9050
9051	0165-S0-006-GS-86-9051
9052	0165-S0-006-GS-86-9052
9053	0165-S0-006-GS-86-9053
9054	0165-S0-006-GS-86-9054
9055	0165-S0-006-GS-86-9055
9144	0165-S0- 006-GS-86-9144
9179	0165-S0-006-GS-86-9179
9180	0165-S0-006-GS-86-9180
	Number  9027  9028  9049  9050  9051  9052  9053  9054  9055  9144  9179

U-3905.15

SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

		_		-				-	_	_	_		
	818	Anal	8/18	8/18	8/18	8/18	8/18	8/18	8/18	8/18	8/18	8/18	
(E+30)	Analysis	Dead	9/13	9/13	9/13	9/13	9/13	9/13	9/13	9/13	9/13	9/13	
Phenola(7/E+30)	tion	Extr	8/14	8/14	8/14	8/14	8/14	8/14	8/14	8/14	8/14	8/14	
<u>E</u>	Extraction	Dead	8/18	8/18	8/18	8/18	8/18	8/18	8/18	8/18	8/18	8/18	
	Analysis	Anal	1	1	ļ	ļ	;	1	1	i	ŀ	1	
(7/5+14	Anal	Dead	!	1	1	1	ł	ł	i	1	ł	1	
Organophos(7/5+14)	Extraction	Extr	}	1	1	1	1	1	1	1	1	-	
<u>010</u>	Extra	Dead	1	l	1	1	1	}	ŀ	1	1	1	
	Analysis	Anal	-	ł	1	1	1	;	1	1	}	ŀ	
Pest/PC8(7/E+40)	Anal	Dead		1	- 	1	1	1	1	ł	1	1	
st/PCB(	Extraction	Extr		1	١	١	1	1	ł	1	1	1	
P <sub>e</sub>	Extra	Dead		1	ł	ł	1	1	ŀ	1	1	i	
	Analysis	Anal	<b>\</b>	ì	١	1	1	1	1	1	ł		
Herb(7/E+30)	Anal	Dead	١	1	1	1	1	1	1	1	1		
Herb(	Extraction	Extr	1	1	1	1	;	ł	1	1	1	ŀ	
	Extra	Dead		1	1	;	1	1	1	1	ļ	1	
	14)	Anal	8/13,15	8/13,15	8/13, 18	8/13,15	8/13,18	8/13,18	8,13,18	8/13,18	8/13,18	8/13,18	
	V0A(14)	Dead		_	8/25		_	_	_	_	_		
	o logo	Date	111/8	8/11	8/11	11/8	8/11	8/11	11/8	11/8	8/11	11/8	
	o loso	Number	6827	6828	6829	0889	6831	6B32	6833	6834	6835	6836	<u> </u>
	Ş	3	3905										H-267

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time expires.
Holding time based on sample date.
Holding time based on sample extraction. DEAD:
EXTR:
ANAL:
( ):
S+#:

STANKEN STANDARD SEEDING STANDARD SEEDING STANDARD STANDARD

	Pet. HC(28)	Anal	111111111
	Pet.	Dead	111111111
	0&G(28)	Anal	8 8 8 7 9 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1
	980	Dead	888888888
	10s (1)	Anal	111111111
	108	Dead	111111111
	Analysis	Anal	111111111
+ 40)	Anal	Dead	111111111
BNA(7/E + 40)	Extraction	Extr	111111111
	Extra	Dead	111111111
	Analysis	Anal	111111111
PAH (7/S + 30)	Anal	Dead	111111111
PAH (7/	Extraction	Extr	111111111
	Extra	Dead	111111111
		Sample Date	8 8 8 8 1 1 1 1 8 8 8 8 8 1 1 1 1 8 8 8 8 1
	į	Number	6827 6828 6829 6830 6831 6831 6835 6835 6835 6835
		gor	3905

DEAD:
EXTR:
ANAL:
( ):
S+#:
E+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time.
Holding time expiration based on sample date.
Holding time expiration based on extraction date.

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

U-3905

	E & E Lab. No. 86-	BLANK	BLANK	6827	6828	6829
Compound	Sample Identity	8-13-86	8-13-86	9027	9028	9049
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
taluene		<250	<250	<250	<250	<250
ethylbenzene	j	<250	<250	<250	<250	<250

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E & E Lab. No. 86-	6830	6831	6832	6833	6834
Compound	Sample Identity	9050	9051	9052	9053	9054
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene	,	<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene		<250	<250	<250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

U-3905.2

	E & E Lab. No. 86-	6835	6836		
Compound	Sample Identity	9055	9144		
chlorobenzene		<250	<250		
1,2-dichl robenzene		<b>&lt;</b> 500	<500		
1,3-dichlorobenzene		<500	<500		
1,4-dichlorobenzene		<500	<500		
benzene		<250	<250		
total xylenes		<500	<500		
toluene		<250	<250		
ethylbenzene		<250	<250		

					Œ.
Que RES  Parameter  chlorobenzene	JALITY CONTROL F SULTS OF ANALYSI ANALYSES OF SO	OR PRECISION S OF REPLICA DIL SAMPLES	ATE		
				U-3905.3	
		(ug		Relative	
Perameter	E&E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)	
chlorobenzene	6833	<250	<250		
1,2-dichlorobenzene	6833	<500	<500		
1,3-dichlorobenzene	6833	<500	<500		
1,4-dichlorobenzene	6833	<500	<500		
benzene	6833	<250	<250		
total xylenes	6833	<500	<500		
toluene	6833	<250	<250		
ethyl benzene	6833	<250	<250		_
	Н-	272			



### QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined	
Compound	Leboratory No. 86-		Percent Recovery		
1,2-dichlorobenzene	6836	<500	1250	1250	100
1,3-dichlorobenzene	6836	<500	1250	1206	97
1,4-dichlorobenzene	6836	<500	1250	1222	98
toluene	6836	<250	1250	1163	93
ethyl benzene	6836	<250	1250	1167	93
		}			



### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

# RESULTS OF SOIL ANALYSIS FOR PURCEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg as received)

U-3905.5

	E&ELeb. No.86-	BLANK	BLANK	6827	6828	6829	6830
Compound	Sample Identity	8/15/86	8/18/86	9027	9028	9049	9050
carbon tetrachloride		<250	<250	<250	<250	<250	<250
1,2-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,1-trichloroethand	•	<250	<250	<250	<250	<250	<250
1,1-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,2-trichloroethan	•	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloroe	hane	<250	<250	<250	<250	<250	<250
chloroethane		<500	<500	<500	<500	<500	<500
2-chloroethylvinyl e	ther	<5000	<5000	<5000	<5000	<5000	<5000
chloroform	ľ	<250	<250	<250	<250	<250	<250
1,1-dichloroethene		<100	<100	<100	<100	<100	<100
trans-1,2-dichloroet	nene	<100	<100	<100	<100	<100	<100
1,2-dichloropropane	1	<1000	<1000	<1000	<1000	<1000	<1000
trans-1,3-dichloropro	ppene	<1000	<1000	<1000	<1000	<1000	<1000
cis-1,3-dichloroprope	ene	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride		910	510	<50	<50	<50	<50
chloromethane		<500	<500	<500	<500	<500	<500
bromomethane		<500	<500	<500	<500	<500	<500
bromo form		<1000	<1000	<1000	<1000	<1000	<1000
bromodichloromethane		<250	<250	<250	<250	<250	<250
fluorotrichlorometha	ne	<500	<500	<500	<500	<500	<500
dichlorodifluorometh	ane	<500	<500	<500	<5 <b>00</b>	<500	<500
chlorodibromomethane		<250	<250	<250	<250	<250	<250
tetrachloroethene		<250	<250	<250	<250	<250	<250
trichloroethene	İ	<250	<250	<250	<250	<250	<250
vinyl chloride		<500	<500	<500	<500	<500	<500

NOTE: Due to low level artifacts present in the methanol used for internal standard preparation and sample extraction, all samples have been blank subtracted. The actual value of the blank has been reported.

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg as received)

U-3905.6

	E & E Lab. No. 86-	6831	6832	6833	6834	6835	6836
Compound	Sample Identity	9051	9052	9053	9054	9055	9144
carbon tetrachloride	•	<250	<250	<250	<250	<250	<250
1,2-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,1-trichloroethar	ne	<250	<250	<250	<250	<250	<250
1,1-dichloroethane	[	<100	<100	<100	<100	<100	<100
1,1,2-trichloroethar	ne	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloroe	thane	<250	<250	<250	<250	<250	<250
chloroethane		<500	<500	<500	<500	<500	<500
2-chloroethylvinyl e	ther	<5000	<5000	<5000	<5000	<5000	<5000
chloroform	1	<250	<250	<250	<250	<250	<250
1,1-dichloroethene	ĺ	<100	<100	<100	<100	<100	<100
trans-1,2-dichloroet	hene	<100	<100	<100	<100	<100	<100
1,2-dichloropropene	į	<1000	<1000	<1000	<1000	<100G	<1000
trans-1,3-dichloropr		<1000	<1000	<1000	<1000	<1000	<1000
cis-1,3-dichloroprop	ene	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride	1	<50 (	<50	<50	<50	<50	<50
chloromethane		<500	<500	<500	<500	<500	<500
bromomethane	ĺ	<500	<500	<500	<500	<500	<500
bromoform	j	<1000	<1000	<1000	<1000	<1000	<1000
bromodichloromethane		<250	<250	<250	<250	<250	<250
fluorotrichloromethe		<500	<500	<500	<500	<500	<500
dichlorodifluorometh		<500	<500	<500	<500	<500	<500
chlorodibromometh <b>ane</b>	•	<250	<250	<250	<250	<250	<250
tetrachloroethene		<250	<250	<250	<250	<250	<250
trichloroethene	ĺ	<250	<250	<250	<250	<250	<250
vinyl chloride		<500	<500	<500	<500	<500	<500

NOTE: Due to low level artifacts present in the methanol used for internal standard preparation and sample extraction, all samples have been blank subtracted. The actual value of the blank has been reported.

からではない。 1 mg にゅうかい こうじょう こうじゅう こうじゅう こうじゅう こうじゅう こうじゅう 1 mg にゅうしゅう 1 mg にゅうしゅうしゅう

## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined	
Compound	Laboratory No. 86-		Percent Recovery		
carbon tetrachloride	6836	<250	1,250	1462	117
1,2-dichloroethane	6836	<100	1,250	1300	104
1,1,1-trichloroethane	6836	<250	1,250	1362	109
1,1-dichloroethane	6836	<100	1,250	1438	115
chloroethane	6836	<500	1,250	1408	113
chloroform	6836	<250	1,250	1400	112
trans-1,2-dichloroethene	6836	<100	1,250	1488	119
methylene chloride	6836	<50	1,250	1416	113
chloromethane	6836	<500	1,250	1351	108
bromomethane	6836	<500	1,250	1430	114
bromoform	6836	<1000	1,250	1172	93.8
bromodichloromethane	6836	<250	1,250	1400	112
trichloroethene	6836	<250	1,250	1312	105



### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

### RESULTS OF SOIL ANALYSIS FOR PHENOLS BY GC

(all results in ug/g as received)

U-39U5.8

	E & E Lab. No. 86-	BLANK	6827	6828	6829	6830
Compound	Sample Identity	8/14/86	9027	9028	9049	9050
phenol		<1.0	<1.0	<1.0	<1.0	<1.0
2-chlorophenol		<1.0	<1.0	<1.0	<1.0	<1.0
2-nitrophenol		<1.0	<1.0	<1.0	<1.0	<1.0
2,4-dimethylphenol		<1.0	<1.0	<1.0	<1.0	<1.0
2,4-dichlorophenol		<1.0	<1.0	<1.0	<1.0	<1.0
4-chlora-3-methylphenol		<1.0	<1.0	<1.0	<1.0	<1.0
2,4,6-trichlorophenol		<1.0	<1.0	<1.0	<1.0	<1.0
2,4-dinitrophenol		<1.0	<1.0	<1.0	<1.0	<1.0
4-nitrophenol		<1.0	<1.0	<1.0	<1.0	<1.0
2-methyl-4,6-dinitrophenol		<1.0	<1.0	<1.0	<1.0	<1.0
pentachlorophenol		<1.0	<1.0	<1.0	<1.0	<1.0

<sup>\*</sup>Compound present below measurable detection limit.



### ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

## RESULTS OF SOIL ANALYSIS FOR PHENOLS BY GC

(all results in ug/g as received)

	E & E Lab. No. 86-	6831	6832	6833	6834	6835
Compound	Sample Identity	9051	9052	9053	9054	9055
phenol		<1.0	<1.0	<1.0	<1.0	<1.0
2-chlorophenol		<1.0	<1.0	<1.0	<1.0	<1.0
2-nitrophenol		<1.0	<1.0	<1.0	<1.0	<1.0
2,4-dimethylphenol		<1.0	<1.0	<1.0	<1.0	<1.0
2,4-dichlorophenol		<1.0	<1.0	<1.0	<1.0	<1.0
4-chloro-3-methylphenol		<1.0	<1.0	<1.0	<1.0	<1.0
2,4,6-trichlorophenol		<1.0	<1.0	<1.0	<1.0	<1.0
2,4-dinitrophenol		<1.0	<1.0	<1.0	.<1.0	<1.0
4-nitrophenol		<1.0	<1.0	<1.0	<1.0	<1.0
2-methyl-4,6-dinitrophenol		<1.0	<1.0	<1.0	<1.0	<1.0
pentachlorophenol		<1.0	<1.0	<1.0	<1.0	<1.0
		1				1

<sup>\*</sup>Compound present below measurable detection limit.



## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86-		Percent Recovery		
4-Chloro-3-Methylphenol	6831	<1.0	20	12	60
2-Chlorophenol	6831	<1.0	20	13	65
2,4-Dichlorophenol	6831	<1.0	20	12	60
2,4-Dimethylphenol	6831	<1.0	20	12	60
2-methyl-4,6-Dinitrophenol	6831	<1.0	20	9.0	45
2-Nitrophenol	6831	<1.0	20	12	60
4-Nitrophenol	6831	<1.0	20	13	65
Pentachlorophenol	6831	<1.0	20	8.0	40
Phenol	6831	<1.0	20	13	65
2,4,6-Trichlorophenol	6831	<1.0	20	15	75





### LABORATORY REPORT

# FOR REESE AIR FORCE BASE

							U-3905.11	
Job No.: U-3905			RE:		DF-200	0		
Sample Date: 8/11/86	6		P.0	P.O. No.:				
Date Received: 8/12/86				pled By:	Ε&Ε,	Inc.		
Sample Type: Soil				ivered By	: Federa	l Express		
RESULTS OF CHEMICAL ANALYSIS OF EXTRACTS FROM EP TOXICITY TESTS AND IGNITABILITY								
	Allov Cond trat						Maximum Allowable Concen- tration (mg/L)	
E&ELab. No. 86-	6837	6838	BLANK					
Customer No.	9179	9180						
Sample Identity								
Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Endrin Lindane Methoxychlor Toxaphene 2,4-D 2,4,5-TP (Silvex) Ignitability, *F	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR				100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.02 0.4 10.0 0.5	

### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst:

Date: H-280





FOR

### REESE AIR FORCE BASE

U-3905.12

Job No.: U-3905		<u> </u>	RE: DF-2000					
Sample Date: 8/11/8	6		P.O. No.: E & E, Inc.					
Date Received: 8/12/8	Sampled B	y:						
Sample Type: Soil			Delivered	By: Feder	al Express			
E & E Lab. No. 86-	6827	6828	6829	6830	6831	6832		
Customer No.	9027	9028	9049	9050	9051	9052		
Sample Identity								
	Results i	n: mg/kgt	unless note	d				
Oil and Grease	<100	<100	<100	140	<100	<100		
Chromium	16	15.3	10.1	7.14	41.7	64.6		
Lead	8.23	8.12	6.46	5.02	2.74	3.24		
Solids, %	74	71	92	88	87	90		
				;				
						:		

t: as received

#### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst:

)ate: \_\_\_\_

Septenber 17, 19A



#### LABORATORY REPORT

FOR

#### REESE AIR FORCE BASE

U-3905.13

Jab No.: U-3905	Job No.: U-3905				RE: DF-2000				
Sample Date: 8/11/8	Sample Date: 8/11/86				P.O. No.: E & E, Inc.				
Date Received: 8/12/8	Sampled B	y:							
Sample Type: Soil			Delivered	By: Feder	al Express				
E & E Lab. No. 86-	6833	6834	6835	6836	BL ANK *				
Customer No.	9053	9054	9055	9144					
Sample Identity									
	Results i	n: mg/kg†	unless note	d					
Oil and Grease	180	160	<100	<100	NA.				
Chromium	10.5	<5	<b>&lt;</b> 5	7.88	<0.05				
Lead	6.81	2.63	3.23	4.96	<0.005				
Solids, %	94	90	91	89	NA				

†: as received
\*: mg/L
NA: Not Applicable

#### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

		(u	ng/g)	Relative
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
4-Chloro-3-Methylphenol	6832	<1.0	<1.0	
2-Chlorophenol	6832	<1.0	<1.0	
2,4-Dichlorophenol	6832	<1.0	<1.0	
2,4-Dimethylphenol	6832	<1.0	<1.0	
2,4-Dinitrophenal	6832	<1.0	<1.0	
2-Methyl-4,6-Dinitrophenol	6832	<1.0	<1.0	
2-Nitrophenol	6832	<1.0	<1.0	
4-Nitrophenol	6832	<1.0	<1.0	
Per. achlorophenol	6832	<1.0	<1.0	
Phenol	6832	<1.0	<1.0	
2,4,6-Trichlorophenol	6832	<1.0	<1.0	



acesen konton konton kontron	Parameter  Solida %  Flashpoint, °F  Chromium  Lead	<del>98040809(1164900</del> 0	ana ang ang ang ang ang ang ang ang ang	MENTALINI DESTRUCTORIO	
		QUALITY CONTROL F RESULTS OF ANALYSI ANALYSES OF SO	OR PRECISION S OF REPLICA OIL SAMPLES	N ATE	
					U-3905.
			(п	ng/kg)	Relative
	Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
	Solids %	6836	89	87	2.3
	Flashpoint, °F	7024*	>140	>140	
	Chromium	6836	7.88	5.33	38.6
	Lead	6836	4.96	4.72	50
			Ì		
	*This represents 10% QC. in the same batch as you	This is not one our samples.	of your samp	les but was a	nalyzed
; ! !					
		H-	284		
<b>DHDHO</b> HGHGHGHGHGHGH		0600000000000000			





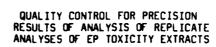
## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E & E	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86-		(mg/kg)		Percent Recovery
Oil and Grease	6836	<100	4450	5100	115
			į		
		;			



### QUALITY CONTROL FOR ACCURACY: PERCENT DIFFERENCE--EPA QUALITY ASSURANCE MATERIALS

	Concentrat	Concentrations in ug/L				
Parameter	Known	Determined	Percent Difference			
Arsenic	46.0	50.9	10.6			
Barium	119,600	118,600	0.8			
Cadmium	940	904	3.8			
Chromium	1030	1010	1.9			
Lead	1010 53.0	997 55.6	1.3 4.9			
Mercury	4.4	4.46	1.4			
Selenium	7.90	8.40	6.3			
Silver	6000	6500	8.3			
		<u> </u>				



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		(mg	Relative		
Parameter	E & E Leboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)	
Arsenic	6838	<0.5	<0.5		
Barium	6838	<5	<5		
Cadmium	6838	<0.1	<0.1		
Chromium	6838	<0.5	<0.5		
Lead	6838	<0.5	<0.5		
Mercury	6838	<0.0008	<0.0008		
Selenium	6838	<0.5	<0.5		
Silver	6838	<0.5	<0.5		
			,		

### ECULOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

### RESULTS OF SOIL ANALYSIS FOR PHENOLS BY GC

(all results in ug/g as received)

	E & E Lab. No. 86-	6836		
^ompound	Sample Identity	9144		
phenol		<1.0	:	
2-chlorophenol		<1.0		
2-nitrophenol		<1.0		
2,4-dimethylphenol		<1.0		
2,4-dichlorophenol		<1.0		
4-chloro-3-methylphenol		<1.0		
2,4,6-trichlorophenol		<1.0		
2,4-dinitrophenol		<1.0		
4-nitrophenol		<1.0		
2-methyl-4,6-dinitrophenol		<1.0		
pentachlorophenol		<1.0		

<sup>\*</sup>Compound present below measurable detection limit.



### SAMPLE IDENTIFICATION CROSS-REFERENCE

U-3911

Laboratory Number 86-	Field Number	Field Location
6871	9105	0165-\$0-008-GS-86-9105
6872	9106	0165-S0-008-GS-86-9106
6873	9107	0165-S0-008-GS-86-9107
6874	9108	0165-S0-008-GS-86-9018
6875	9109	0165-S0-008-GS-86-9109
6876	9110	0165-S0-008-GS-86-9110
6877	9139	0165-S0-008-GS-86-9139
6878	9181	0165-S0-008-GS-86-9181
6879	9182	0165-S0-008-GS-86-9182



SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

<u>yais</u>	8/19 8/19 8/19 8/20 8/20 8/20
(E+30) Analysis	9/13 9/13 9/13 9/13 9/13
Phenola(7/E+30) Extraction Ana	88888 44778 44444 44444 44444
Extra	8 179 8 8 179 8 8 179 8 8 179 8 8 179 8 8 179 8 8 179 8 8 179 8 179 8 8 179 8 8 179 8 8 179 8 8 179 8 8 179 8 8 179 8 8 179 8
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14)	8/13, 19 8/13, 19 8/13, 19 8/14, 19 8/14, 19
V0A(14)	8 3 2 6 8 8 7 2 6 8 7 2 6 8 8 7 2 6 7 2 6 7 2 6 7 2 6 7 2 6
Seaple	8 8 8 7 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
Semple	6871 6873 6874 6875 6876 6876 6877
gor	H-290

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time expires.
Holding time based on sample date.
Holding time based on sample extraction. DEAD: EXTR: ANAL: ( ): S+#:



55:55 5 550000

SOURCE PROGRESS BESEEVE BESEEVET BENEATT BENEADS PERSONS VEIN



SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3911.16

	Pet. HC(28)	Anal	
_	Pet.	Dead	
	0&G(28)	Anal	8/21 8/21 8/21 8/21 8/21
	080	Dead	66666666666666666666666666666666666666
	TDS (7)	Anel	
	10S	Dead	111111
	Analysis	Anal	1111111
+ 40)	Anel	Dead	111111
BNA(7/E + 40)	Extraction	Extr	111111
	Extra	Dead	
	Analysis	Anel	111111
(02 + 5)	Anel	Dead	111111
PAH (7/5 + 30)	Extraction	Extr	111111
	Extre	Dead	
	e (cas)	Date	8/12 8/12 8/12 8/12 8/12
	9	Number	6871 6873 6873 6874 6875 6876 6877
	4	300	3911

DEAD: EXTR: ANAL: ( ): S+#: E+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time.
Holding time expiration based on sample date.
Holding time expiration based on extraction date.

HULL HOURS SHOW STONE SOWN FORM PROPER WESTER SECON BOOKS DIVINE THE





### LABORATORY REPORT

FOR

#### REESE AIR FORCE BASE

U-3911.1

Job No.: U-3911			RE:	DF-20	00			
Sample Date: 8/12/8	ple Date: 8/12/86				P.O. No.:			
Date Received: 8/13/8	6		Sampled B	y: E&E	, Inc.			
Sample Type: Soil			Delivered	By: Feder	al Express			
E & E Lab. No. 86-	6871	6872	6873	6874	6875	6876		
Customer No.	9105	9106	9107	9108	9109	91 10		
Sample Identity								
	Results i	n: mg/kg,	as received	unless not	ed			
Oil and Grease Arsenic Solids, %	<100 <2.7† 75	<100 6.52 84	<100 <2.7† 88	<100 <2.7† 88	<100 3.33 91	<100 1.95 92		

<sup>†</sup>Elevated detection limits due to matrix interferences.

### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: fay 1/25/1/00

Date: Suptimble 3, 1980



#### LABORATORY . LEPORT

FOR

#### REESE AIR FORCE BASE

U-3911.2

Job No.: U-3911			RE:	DF-20	00	
Sample Date: 8/12/86			P.O. No.:			
Date Received: 8/13/8	6		Sampled B	y: E&E	, Inc.	
Sample Type: Soil			Delivered	By: Feder	al Express	
E & E Lab. No. 86-	6877	Blank*				
Customer No.	9139		,			
Sample Identity						
	Results i	n: mg⁄kg,	as received	unless not	ed	
Oil and Grease Arsenic Solids, %	<100 2.66 87	NA <0.005 NA				

NA: Not Applicable \*mg/L

ACCORDED ROCKESSA PROFESSOR PROFESSORS CONTRACTOR CONTRACTOR CONTRACTOR CONTRACTOR CONTRACTOR

### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Deta.

Supervising Analyst:

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

U-3911.3

	E & E Lab. No. 86-	Blank	Blank	6871	6872	6873
Compound	Sample Identity	8/13/86	8/14/86	9105	9106	9107
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene	<500	<500	<500	<500	<500	
1,3-dichlorobenzene		<500	<500	<500	<b>&lt;500</b>	<500
1,4-dichlorobenzene		<500	<500	<500	<50 <b>0</b>	<50 <b>0</b>
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene	<250	<250	<250	<250	<250	
ethylbenzene		<250	<250	<250	<250	<250

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

U-3911.4

	E & E Lab. No. 86-	6874	6875	6876	6877	
Compound	Sample Identity	9108	9109	91 10	91 39	
chlorobenzene	chlorobenzene			<250	<250	
1,2-dichlorobenzene	1,2-dichlorobenzene		<500	<500	<500	
1,3-dichlorobenzene		<500	<500	<500	<500	
1,4-dichlarobenzene		<500	<500	<500	<500	
benzene		<250	<250	<250	<250	
total xylenes	total xylenes		<500	<500	<500	
toluene		<250	<250	<250	<250	
ethylbenzene		<250	<250	<250	<250	



# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined	
Compound	Laboratory No. 86-		(ug/kg)		
1,2-dichlorobenzene	6877	<500	1250	1185	95
1,3-dichlarobenzene	6877	<500	1250	1185	95
1,4-dichlorobenzene	6877	<500	1250	1176	94
toluene	6877	<b>4250</b>	1250	1167	93
ethyl benzene	6877	<250	1250	1174	94



# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

# RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALDCARBON COMPOUNDS BY GC (all results in ug/kg, as received)

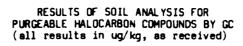
U-3911.6

	E & E Lab. No. 86-	Blank	6871	6872	6873	6874	6875
Compo und	Sample Identity	8/19/86	9105	9106	9107	9108	9109
carbon tetrachlorid	e	<250	<250	<250	<250	<250	<250
1,2-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,1-trichloroethe	ne	<250	<250	<250	<250	<250	<250
1,1-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,2-trichloroetha	ne	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloro	ethane	<250	<250	<250	<250	<250	<250
chloroethane		<500	<500	<500	<500	<500	<500
2-chloroethylvinyl	ether	<5000	<5000	<5000	<5000	<5000	<5000
chloroform		<250	<250	<250	<250	<250	<250
1,1-dichloroethene		<100	<100	<100	<100	<100	<100
trans-1,2-dichloroe	thene	<100	<100	<100	<100	<100	<100
1,2-dichloropropane	•	<1000	<1000	<1000	<1000	<1000	<1000
trans-1,3-dichlorop	ropene	<1000	<1000	<1000	<1000	<1000	<1000
cis-1,3-dichloropro	pen <b>e</b> .	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride		180	<50	<50	<50	<50	<50
chloromethane		<500	<500	<500	<500	<500	<500
bromomethane		<500	<500	<500	<500	<500	<500
bromoform		<1000	<1000	<1000	<1000	<1000	<1000
bromodichloromethan	ie	<250	<250	<250	<250	<250	<250
fluorotrichlorometh	nane	<500	<500	<500	<500	<500	<500
dichlorodifluorome	.hane	<50 <b>0</b>	<500	<500	<500	<500	<500
chlorodibromomethar	ne	<250	<250	<250	<2 <sup>-</sup> 0	<250	<250
tetrachloroethene		<250	<250	<250	<250	<250	<250
trichloroethene		<250	<250	<250	<250	<250	<250
vinyl chloride		<500	<500	<500	<500	<500	<500

NOTE: Oue to low level artifacts present in the methanol used for internal standard preparation and sample extraction, all samples have been blank subtracted. The actual value of the blank has been reported.



# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R



U-3911.7

	E&ELab. No.86-	6876	6877		
Compound	Sample Identity	9110	9139		
carbon tetrachloride		<250	<250		
1,2-dichloroethane		<100	<100		
1,1,1-trichloroethane	•	<250	<250		
1,1-dichloroethane		<100	<100		
1,1,2-trichloroethane	.	<500	<500	ļ	
1,1,2,2-tetrachloroet	hane	<250	<250		ļ
chloroethane		<500	<500		
2-chloroethylvinyl et	her	<5000	<5000		
chloroform		<250	<250		
1,1-dichloroethene		<100	<100		
trans-1,2-dichloroeth	nene	<100	<100		
1,2-dichloropropane		<1000	<1000		ļ
trans-1,3-dichloropro	pene	<1000	<1000	}	]
cis-1,3-dichloroprope	ne	<1000	<1000	1	1
methylene chloride	Ì	<50	<50		
chloromethane		<500	<500		
bromomethane		<500	<500		Ì
bromoform		<1000	<1000		]
bromodichloromethane		<250	<250	ł	i
fluorotrichloromethan	ne	<50 <b>0</b>	<500	j	
dichlorodifluorometha	ane	<500	<500		
chlorodibromomethane	Ì	<250	<250		
tetrachloroethene	İ	<250	<250	l	
trichloroethene		<250	<250		
vinyl chloride		<500	<500		

NOTE: Due to low level artifacts present in the methanol used for internal standard preparation and sample extraction, all samples have been blank subtracted. The actual value of the blank has been reported.





# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined	
Compound	Laboratory No. 86-		Percent Recovery		
carbon tetrachloride	6877	<250	12 50	1375	110
1,2-dichloroethane	6877	<100	1250	1375	110
1,1,1-trichloroethane	6877	<250	1250	1400	112
1,1-dichloroethane	6877	<100	1250	1450	116
chloroethane	6877	<500	1250	1134	90.7
chloroform	6877	<250	1250	1388	111
trans-1,2-dichloroethene	6877	<100	1250	1400	112
methylene chloride	6877	<50	1250	571.2	45.7
chloromethane	6877	<500	1250	1206	96.5
bromomethane	6877	<500	1250	1175	94.0
bromoform	6877	<1000	1250	1250	100
bromodichloromethane	6877	<250	1250	1425	114
trichloroethene	6877	<250	1250	1788	143



### LABORATORY REPORT

FOR

#### REESE AIR FORCE BASE

U-3911.9

Job No.: U-391	•		"	:	DF -2 00		
Sample Date: 8/12/86			Ρ.	P.O. No.:			
Date Received: 8/13/	86		Se	mpled By:	E&E,	, Inc.	<del></del>
Sample Type: Soil	De	livered By	: Feder	al Express	- · · · · · ·		
RESULTS OF CHEMICA	L ANALYSIS	OF EXTRA	CTS FROM	EP TOXIC	ITY TESTS	AND IGNII	ABILITY
			ç	ng/L '			Maximum Allowable Concen- tration (mg/L)
E & E Lab. No. 86-	6878	6879	Blank				
Customer No.	9181	9182					
Sample Identity				<del> </del>			
Arsenic  Be in  I im  Lead  Mercury  Selenium  Silver  Endrin  Lindane  Methoxychlor  Toxaphene  2,4-D  2,4,5-IP (Silvex)  Ignitability, °F	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR	<0.5 <5.0 <0.1 <0.5 <0.5 <0.0008 <0.5 <0.5 NR NR NR NR NR NR				5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.02 0.4 10.0 0.5

NR: Not Requested NA: Not Applicable

#### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst:

Date:



# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

### RESULTS OF SOIL ANALYSIS FOR PHENOLS BY GC

(all results in ug/g, as received)

	E & E Lab. No. 86-	Blank	6871	6872	6873	6874	
Compound	Sample Identity	8/14/86	9105	9106	9107	9108	
phenol		<1.0	<1.0	<1.0	<1.0	<1.0	
2-chlorophenol		<1.0	<1.0	<1.0	<1.0	<1.0	
2-nitrophenol		<1.0	<1.0	<1.0	<1.0	<1.0	
2,4-dimethylphenol		<1.0	<1.0	<1.0	<1.0	<1.0	
2,4-dichlorophenol		<1.0	<1.0	<1.0	<1.0	<1.0	
4-chloro-3-methylphenol		<1.0	<1.0	<1.0	<1.0	<1.0	
2,4,6-trichlorophenol		<1.0	<1.0	<1.0	<1.0	<1.0	
2,4-dinitrophenol		<1.0	<1.0	<1.0	<1.0	<1.0	
4-nitrophenol		<1.0	<1.0	<1.0	<1.0	<1.0	
4,6-dinitro-2-methylphenol		<1.0	<1.0	<1.0	<1.0	<1.0	
pentachlorophenol		<1.0	<1.0	<1.0	<1.0	<1.0	

<sup>\*</sup>Compound present below measurable detection limit.



#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

U-3911.11

	(mg	Relative	
E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
6875	90	91	1.1
6877	2.66	<2.7	
	No. 86-	E & E Laboratory No. 86- Original Analysis  6875 90	Laboratory Original Replicate Analysis  6875 90 91

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# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined	Percent	
Parameter	Laboratory No. 86-		(mg/kg)			
Oil and Grease	6877	<100	3520	3840	109	



# QUALITY CONTROL FOR ACCURACY: PERCENT DIFFERENCE--EPA QUALITY ASSURANCE MATERIALS

	Concentrat		
Parameter	Known Determined		Percent Difference
Arsenic	46.0	45.3	1.5
Barium	119,600	118,600	0.8
Cadmium	940	904	3.8
Chromium	1030	1010	1.9
Lead	1010	997	1.3
Mercury	4.4	4.46	1.4
Selenium	7,90	8.40	6.3
Silver	6000	6500	8.3
	<u> </u>		

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF EP TOXICITY EXTRACTS

		(m	g/L)	Relative
Parameter	E&E Laboratory No.86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Arsenic	6838 <b>*</b>	<0.5	<0.5	
Barium	6838*	<5	<b>&lt;</b> 5	
Cadmium	6838*	<0.1	<0.1	
Chromium	6838*	<0.5	<0.5	
Lead	6838*	<0.5	<0.5	
Mercury	6838*	<0.0008	<0.0008	
Selenium	6838*	<0.5	<0.5	
Silver	6838 <del>*</del>	<0.5	<0.5	
		<u> </u>		

<sup>\*</sup>This represents 10% QC. This is not one of your samples but was analyzed in the same batch as your samples.

# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

### RESULTS OF SOIL ANALYSIS FOR PHENOLS BY GC

(all results in ug/g, as received)

U-3911.17

	E & E Lab. No. 86-	6875	6876	6877		
Compound	Sample Identity	9109	9110	9139		
phenol		<1.0	<1.0	<1.0		
2-chlorophenol		<1.0	<1.0	<1.0		1
2-nitrophenol		<1.0	<1.0	<1.0		
2,4-dimethylphenol		<1.0	<1.0	<1.0		1
2,4-dichlorophenol		<1.0	<1.0	<1.0	1	
4-chlora-3-methylphenal		<1.0	<1.0	<1.0	Ì	
2,4,6-trichlorophenol		<1.0	<1.0	<1.0	i	İ
2,4-dinitrophenol		<1.0	<1.0	<1.0		
4-nitrophenol		<1.0	<1.0	<1.0		
4,6-dinitro-2-methylphenol		<1.0	<1.0	<1.0		1
pentachlorophenol		<1.0	<1.0	<1.0		

<sup>\*</sup>Compound present below measurable detection limit.

STREET OF THE ST



# SAMPLE IDENTIFICATION CROSS-REFERENCE

U-3969

Laboratory Number 86-	Field Number	Field Location
7294	9111	0165-PG-008-GP-86-9111
7295	9112	0165-PG-008-GP-86-9112
7296	9113	0165-PG-008-GP-86-9113
7297	9088	0165-PG-005-GP-86-9088
7298	9089	0165-PG-005-GP-86-9089



SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

						_	_	_		_			 
	818	Anal	A/76	8/26	8/26	8/27	: 1	8/27					_
E+30)	Analysis	Dead	06/6	9/20	9/20	9/20	:	9/20					
Phenols(7/E+30)	tion	Extr	B/7.1	8/21	8/21	8/21	1	8/21					
Æ	Extraction	Dead	8/25	8/25	8/25	8/25	-	8/25					
<u> </u>	Analysis	Anal	:	;	;	1	;	1					
41+5/2)	Anal	Dead	-	1	ŧ	;	!						
Organophos(7/5+14)	Extraction	Extr	;	-	;	!	ì	;					
Org	Extra	Dead		ŀ	:	1	;	;					
	Analysis	Anal	;	;		!		;					
7/E+40)	Anal	Dead		 ¦	ļ	:	;	;					
Pest/PCB(7/E+40)	Extraction	Extr	  -	;	;	i i	1	;					
_ 	Extra	Dead	1	!	;	1	;	1					
	Analysis	Anal	1	1	;	1	;	1					
Herb(7/E+30)	Anal	Dead		1	;	!	;	!					
Herb(7	Extraction	Extr	1	1	;	ł	;	!					
	Extra	Dead	;	1	1	1	1	1					
	<b>4</b>	Anal	1/20,21	8/20,21	12,02/	17,07/	720,21	•		ſ	6		
	V0A(14)	Dead		1/6		_	-	<u>.</u>		, V0A	Confirmation Date	8/21,28 8/21,28	
-	e Come	Date	/18	8/18	95	91,	718	- B			<u> ප</u> ි	യയ	
		Naber				_			_	•		7297 7298	
		Ž	25	7295	777	67/	2	7 <i>81</i>				<b>-</b> ,	
	qq		3969							H-(	308		
				-									

Date sample holding time expires. Date sample was extracted. DEAD: EXTR:



SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3969.19

	<u>(8</u>	   181	
	Pet. HC(28)	J Anal	11111
	Pet	Dead	11111
	0&G(2B)	Anal	9/11 9/11 9/15 9/15
	980	Dead	9/15 9/15 9/15 9/15
	TDS (7)	Dead Anal	11111
	5	Dead	11111
	818	Anal	8/22 8/22 8/22 8/25 8/25
+ 40)	Analysis	Dead Anal	9/29 9/29 9/29 9/29 9/29
BNA(7/E + 40)	tion	Dead Extr	8/20 8/20 8/20 8/20 8/20
	Extraction	Dead	8/25 8/25 8/25 8/25 8/25
	ysis	Anal	11111
\$ + 30)	Analysis	Dead Extr Dead Anal	11111
PAH (7/5 + 30)	xtraction	Extr	11111
_,	Extra	Dead	1111
	Sample	Date	8/18 8/18 8/18 8/18 18
	Sample	Number	7294 7295 7296 7297 7298
	Job		9968

DEAD: EXTR: ANAL: ( ): S+#:

Date sample holding time expires.

Date sample was extracted.

Date sample was analyzed.

Holding time.

Holding time expiration based on sample date.

Holding time expiration based on extraction date.

# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

# RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/L as received)

	E & E Lab. No. 86+	Blank	7294	7295	7296	7297*
Compound	Sample Identity	8/20/86	9111	9112	9113	9088
chlorobenzene		<0.20	<0.20	<0.20	<0.20	<0.20
1,2-dichlorobenzene	1	<0.40	<0.40	<0.40	<0.40	<0.40
1,3-dichlorobenzene		<0.40	<0.40	<0.40	<0.40	<0.40
1,4-dichlorobenzene		<0.30	<0.30	<0.30	<0.30	<0.30
benzene		<0.20	<0.20	<0.20	<0.20	<0.20
total xylenes		<1.0	<1.0	<1.0	<1.0	<1.0
toluene		<0.20	<0.20	<0.20	<0.20	1.7
ethylbenzene		<0.20	<0.20	<0.20	<0.20	<0.20

<sup>\*</sup>Sample confirmed - results positive.



### LABORATORY REPORT

FOR

REESE AIR FORCE BASE

U-3969.2

Job No.:	U-3969	U-3969		DF-20	000				
Sample Date:	8/18/86		P.O. No.:						
Date Received:	8/19/86		Sampled B	ly: E&E	, Inc.				
Sample Type:	Water	,	Delivered	By: Feder	al Express	- ,			
E & E Lab. No. 86-	7294	7295	7296	7297	7298	Blank			
Customer No.	9111	9112	9113	9088	9089				
Sample Identity									
	Results i	.n: mg/L un	less noted			<b></b>			
Oil and Grease Antimony Beryllium Cadmium Chromium Copper Lead Nickel Silver Thallium Zinc	0.5 <0.15 <0.01 <0.005 <0.05 <0.02 <0.005 <0.1 <0.04 <0.20 <0.05	0.5 <0.15 <0.01 <0.005 <0.05 <0.02 0.003 <0.1 <0.04 <0.20 0.298	0.5 <0.15 <0.01 <0.005 <0.05 <0.02 0.008 <0.1 <0.04 <0.20 0.179	1.3 <0.15 <0.01 <0.005 <0.05 <0.02 0.014 <0.1 <0.04 <0.20 0.195	2.9 <0.15 <0.01 <0.005 <0.05 0.023 0.019 <0.1 <0.04 <0.20 0.209	NA <0.15 <0.01 <0.005 <0.05 <0.02 <0.005 <0.1 <0.04 <0.20 <0.05			

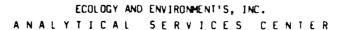
NA: Not applicable.

Analytical References:

"Methods for the Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March, 1983.

Supervising Analyst:

Date:



### RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/L as received)

	E & E Lab. No. 86-	7298*		
Compound	Sample Identity	9089		
chlorobenzene		<0.20		
1,2-dichlorobenzene		<0.40		,
1,3-dichlorobenzene		<0.40		
1,4-dichlorobenzene		<0.30		
benzene		<0.20		
total xylenes		<1.0		!
toluene		2.2		
ethylbenzene		<0.20		

<sup>\*</sup> Sample confirmed - results positive.



# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED WATER SAMPLES

	E & E	Original Value	Amount Added	Amount Determined		
Compound	Laboratory No. 86-					
1,2-dichlorobenzene	7298	<0.40	10.0	9.2	92	
1,3-dichlorobenzene	7298	<0.40	10.0	9.1	91	
1,4-dichlorobenzene	7298	<0.30	10.0	9.2	92	
toluene	7298	2.2	10.0	12.5	103	
ethyl benzene	7298	<0.20	10.0	9.4	94	

# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

# RESULTS OF WATER ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/L)

	E & E Lab. No. 86-	Blank	7294	7295	7296	7297*	7298*
Compound	Sample Identity	8/21/86	9111	9112	9113	9088	9089
carbon tetrachloride		<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
1,2-dichloroethane		<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
1,1,1-trichloroethan	e l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
1,1-dichloroethane		<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
1,1,2-trichloroethan	e	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
1,1,2,2-tetrachloroe	thane	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
chloroethane	1	<0.52	<0.52	<0.52	<0.52	<0.52	<0.52
2-chloroethylvinyl e	ther	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13
chloroform		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,1-dichloroethene		<0.13	<0.13	<0.13	<0.13	<0.13	<0.13
trans-1,2-dichloroet	hene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-dichloropropane		<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
trans-1,3-dichloropr	opene	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34
cis-1,3-dichloroprop	ene	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
methylene chloride	ŀ	<0.25	<0.25	<0.25	<0.25	4.0	6.6
chloromethane	l	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
bromomethane		<1.18	<1.18	<1.18	<1.18	<1.18	<1.18
bromoform	ł	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
bromodichloromethane		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
fluorotrichlorometha	ne	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
dichlorodifluorometh	ane	<1.81	<1.81	<1.81	<1.81	<1.81	<1.81
chlorodibromomethane	·	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
tetrachloroethene	1	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
trichloroethene		<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
vinyl chloride		<0.18	<0.18	<0.18	<0.18	<0.18	<0.18

<sup>\*</sup>Sample confirmed - results positive.





# QUALITY CONTRUL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED WATER SAMPLES

	E & E Laboratory	Original Value	Amount Added	Amount Determined	
Compound	No. 86- 7297		Percent Recovery		
carbon tetrachloride		<0.12	10.0	10.6	106
1,2-dichloroethane		<0.03	10.0	11.4	114
1,1,1-trichloroethane		<0.03	10.0	10.8	108
1,1-dichloroethane		<0.07	10.0	13.6	136
chloroethane		<0.52	10.0	10.2	102
chloroform		<0.05	10.0	11.1	111
trans-1,2-dichloroethene		<0.10	10.0	13.0	130
methylene chloride		4.0	10.0	12.3	83.0
chloromethane		<0.08	10.0	10.4	104
bromomethane		<1.18	10.0	14.0	140
bromoform		<0.20	10.0	11.0	110
bromodichloromethane		<0.10	10.0	10.1	101
trichloroethene		<0.12	10.0	8.59	85.9



# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

# RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANTS BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/L)

	E & E Lab. No. 86-	7294	7295	7296	7297	7298
Compound	Sample Identity	9111	9112	9113	9088	9089
bis(2-chloroethyl)ether		<10	<10	<10	<10	<10
1,3-dichlorobenzene		<10	<10	<10	<10	<10
1,4-dichlorobenzene		<10	<10	<10	<10	<10
1,2-dichlorobenzene		<10	<10	<10	<10	<10
bis(2-chloroisopropyl)ether		<10	<10	<10	<10	<10
N-nitrosodipropylamine		<10	<10	<10	<10	<10
hexachloroethane		<10	<10	<10	<10	<10
nitrobenzene		<10	<10	<10	<10	<10
isophorone		<10	<10	<10	<10	<10
bis(2-chloroethoxy)methane		<10	<10	<10	<10	<10
1,2,4-trichlorobenzene		<10	<10	<10	<10	<10
naphthalene		<10	<10	<10	<10	<10
hexachlorobutadiene		<10	<10	<10	<10	<10
hexachlorocyclopentadiene		<10	<10	<10	<10	<10
2-chloronaphthalene		<10	<10	<10	<10	<10
dimethyl phthalate		<10	<10	<10	<10	<10
acenaphthylene		<10	<10	<10	<10	<10
fluorene		<10	<10	<10	<10	<10
acenaphthene		<10	<10	<10	<10	<10
2,4-dinitrotoluene		<10	<10	<10	<10	<10
2,6-dinitrotoluene		<10	<10	<10	<10	<10
diethylphthalate		<10	<10	<10	<10	<10
4-chlorophenyl phenyl ether		<10	<10	<10	<10	<10
N-nitrosodiphenylamine		<10	<10	<10	<10	<10
4-bromophenyl phenyl ether hexachlorobenzene		<10	<10	<10	<10	<10
		<10	<10	<10	<10	<10
phenanthrene anthracene		<10 <10	<10 <10	<10 <10	<10 <10	<10
di-n-butyl phthalate		12	15			<10
fluoranthene		<10	<10	18 <10	10 <10	24
benzidine		<50	<50	<50	<50	<10 <50
pyrene		<10 <10	<10	<10	<10	<10
butyl benzyl phthalate		<10 <10	<10	<10 <10	<10 <10	<10 <10
3,3'-dichlorobenzidine		<30	<30	<30	<30	<30
benzo(a) anthracene		<10	<10	<10	<10	<10
bis(2-ethylhexyl)phthalate		<10	<10	<10 <10	<10	<10
chrysene		<10	<10	<10	<10	<10
di-n-octyl phthalate		<10	<10	<10	<10	<10
benzo(b) fluoranthene		<10	<10	<10	<10	<10
benzo(k)fluoranthene		<10	<10	<10	₹10	₹10
benzo(a)pyrene	İ	<10	<10	<10	<10	<10
indeno(1,2,3-cd)pyrene		<10	<10	<10	<10	<10
dibenzo(a,h)anthracene		<10	<10	<10	<10	<10
benzo(ghi)perylene		<10	<10	<10	<10	<10

<sup>\*</sup>Compound present below measurable detection limit.



# ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

# RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/L)

	E & E Lab. No. 86-	7294	7295	7296	7297	7298
Compound	Sample Identity	9111	9112	9113	9088	9089
phenol	, —	<10	<10	<10	<10	<10
2-chlorophenol		<10	<10	<10	<10	<10
2-nitrophenol		<10	<10	<10	<10	<10
2,4-dimethylphenol		<10	<10	<10	<10	<10
2,4-dichlorophenol		<10	<10	<10	<10	<10
4-chloro-3-methylphenol		<10	<10	<10	<10	<10
2,4,6-trichlorophenol		<10	<10	<10	<10	<10
2,4-dinitrophenol		<30	<30	<30	<30	<30
4-nitrophenol		<10	<10	<10	<10	<10
4,6-dinitro-2-methylpheno	1	<30	<30	<30	<30	<30
pentachlorophenol		<30	<30	<30	<30	<30

<sup>\*</sup>Compound present below measurable detection limit.



# ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

# RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/L)

	E & E Lab. No. 86-	Method Blank			
Compound	Sample Identity				
bis(2-chloroethyl)ether		<10			
1,3-dichlorobenzene		<10	j		
1,4-dichlorobenzene		<10	ł		j
1,2-dichlorobenzene		<10	į	ł	
bis(2-chloroisopropyl)ether		<10	İ	1	
N-nitrosodipropylamine		<10	j	Ì	j
hexachloroethane		<10	ł	1	Ì
nitrobenzene	ŀ	<10	ł		
isophorone	ŀ	<10	1	1	
bis(2-chloroethoxy)methane		<10	ł	1	1
1,2,4-trichlorobenzene	į	<10	ł		1
naphthalene	ł	<10	1	Ì	
hexachlorobutadiene	ŀ	<10	ł	[	}
hexachlorocyclopentadiene	i	<10	<b> </b>	j	j
2-chloronaphthalene	1	<10	Ì	}	}
dimethyl phthalate		<10	i	ļ	}
acenaphthylene		<10	1		
fluorene		<10		ļ	
acenaphthene	1	<10		1	ŀ
2,4-dinitrotoluene		<10			ļ
2,6-dinitrotoluene		<10	ļ	İ	
diethylphthalate	}	<10			ł
4-chlorophenyl phenyl ether	1	<b>&lt;10</b>	1	İ	i
N-nitrosodiphenylamine		<10	İ		İ
4-bromophenyl phenyl ether		<10			İ
hexachlorobenzene	Ì	<10			
phenanthrene	j	<10			
anthracene		<10	İ		j
di-n-butyl phthalate	ļ	<10*	1	ł	
fluoranthene	j	<10	1		}
benzidine		<50	1		
pyrene	]	<10	1		}
butyl benzyl phthalate		<10			
3,3'-dichlorobenzidine	ì	<30		İ	
benzo(a)anthracene		<10		1	
bis(2-ethylhexyl)phthalate		<10		1	
chrysene		<10		}	
di-n-octyl phthalate		<10			
benzo(b)fluoranthene		<10			
benzo(k)fluoranthene	1	<10			
benzo(a)pyrene		<10		ľ	
indeno(1,2,3-cd)pyrene		<10			
dibenzo(a,h)anthracene		<10	i		
benzo(ghi)perylene		<10	i	I	ī

<sup>\*</sup>Compound present below measurable detection limit.



# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

# RESULTS OF WATER ANALYSIS FOR PRIDRITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/L)

U~3969.10

	E & E Lab. No. 86-	Method Blank				
Compound	Sample Identity					
phenol	•	<10				
2-chlorophenol		<10				
2-nitrophenol		<10			İ	1
2,4-dimethylphenol		<10		1		Ì
2,4-dichlorophenol		<10	1			ł
4-chloro-3-methylphenol		<10	1	}	]	
2,4,6-trichlorophenol		<10	1	İ		İ
2,4-dinitrophenol		<30	1	ļ		ł
4-nitrophenol		<10	1	j	j	j
4,6-dinitro-2-methylphenol		<30	ł		[	
pentachlorophenol		<30		}	1	

<sup>\*</sup>Compound present below measurable detection limit.



# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY OF SURROGATE SPIKES

U-3969.11

	E & E	Amount Added	Amount Determined		
Compound	Laboratory No. 86-	(ug/L)		Percent Recovery	
nitrobenzene-D5	7294 7295 7296 7297 7298	100 100 100 100 100	56 72 72 70 79	56 72 72 70 79	
2-fluorobiphenyl	7294 7295 7296 7297 7298	100 100 100 100 100	55 74 78 67 79	55 74 78 67 79	
terphenyl-D14	7294 7295 7296 7297 7298	100 100 100 100 100	57 84 74 69 73	57 84 74 69 73	
phenol-D5	7294 7295 7296 7297 7298	200 200 200 200 200 200	60 71 60 58 43	30 35.5 30 29 21.5	
2-fluorophenol	7294 7295 7296 7297 7298	200 200 200 200 200 200	94 90 89 107 83	47 45 44.5 53.5 41.5	
2,4,6-tribromophenal	7294 7295 7296 7297 7298	200 200 200 200 200 200	123 140 139 152 117	61.5 70 69.5 76 58.5	

These recoveries are acceptable to  $\ensuremath{\mathsf{EPA}}$  Contract Lab Program (CLP) guidelines.

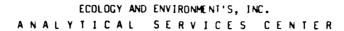
#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

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	_	U	ıg/l	Relative
Compound	£ & £ Lab. No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
bis(2-chloroethyl)ether		<10	<10	
1,3-dichlorobenzene		<10	<10	
1,4-dichlorobenzene		<10	<10	
1,2-dichlarabenzene		<10	<10	
bis(2-chloroisopropyl)ether		<10	<10	
N-nitrosodipropylamine		<10	<10	
hexachloroethane		<10	<10	
nitrobenzene		<10	<10	
isophorone		<10	<10	
bis(2-chloroethoxy)methane		<10	<10	
1,2,4-trichlorobenzene		<10	<10	
naphthalene		<10	<10	
hexachlorobutadiene		<10	<10	
hexachlorocyclopentadiene		<10	<10	
2-chloronaphthalene		<10	<10	
dimethyl phthalate		<10	<10	
acenaphthylene		<10	<10	
fluorene		<10	<10	
acenaphthene		<10	<10	
2,4-dinitrotoluene	Ji	<10	<10	
2,6-dinitrotoluene		<10	<10	
diethylphthalate		<10	<10	
4-chlorophenyl phenyl ether		<10	<10	
N-nitrosodiphenylamine		<10	<10	
4-bromophenyl phenyl ether		<10	<10	
hexachlorobenzene		<10	<10	
phenanthrene	ı	<10	<10	
anthracene		<10	<10	
di-n-butyl phthalate		12	23	62.9
fluoranthene		<10	<10	
benzidine		<50	<50	
pyren <b>e</b>		<10	<10	
butyl benzyl phthalate		<10	<10	
3,3'-dichlorobenzidine		<30	<30	
benzo(a)anthracene	•	<10	<10	
bis(2-ethylhexyl)phthalate	1	<10	<10	
chrysene		<10	<10	J
di-n-octyl phthalate		<10	<10	
benzo(b)fluoranthene		<10	<10	
benzo(k)fluoranthene		<10	<10	
benzo(a)pyrene		<10	<10	
indeno(1,2,3-c,d)pyrene		<10	<10	
dibenzo(a,h)anthracene		<10	<10	
benzo(g,h,i)perylene		<10	<10	
		ļ <u>```</u>		

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

		ug/L		Relative	
Compound	E & E Lab. No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)	
phenol		<10	<10		
2-chlorophenol		<10	<10		
2-nitrophenol	,	<10	<10		
2,4-dimethylphenol		<10	<10		
2,4-dichlorophenol		<10	<10		
4-chloro-3-methylphenol		<10	<10	<b></b>	
2,4,6-trichlorophenol		<10	<10	_ <del></del>	
2,4-dinitrophenol		<30	<30		
4-nitrophenol		<10	<10		
4,6-dinitro-2-methylphenol		<30	<30		
pentachlorophenol		<30	<30		



# RESULTS OF WATER ANALYSIS FOR PHENOLS BY GC

(all results in ug/L)

	E & E Lab. No. 86-	Blank	7294	7295	7296	7297
Compound	Sample Identity	8/21/86	9111	9112	9113	9088
phenol		<2.0	<2.0	<2.0	<2.0	<2.0
2-chlorophenol		<2.0	<2.0	<2.0	<2.0	<2.0
2-nitrophenol		<2.0	<2.0	<2.0	<2.0	<2.0
2,4-dimethylphenol		<2.0	<2.0	<2.0	<2.0	<2.0
2,4-dichlorophenol		<2.0	<2.0	<2.0	<2.0	<2.0
4-chloro-3-methylphenol		<2.0	<2.0	<2.0	<2.0	<2.0
2,4,6-trichlorophenol		<2.0	<2.0	<2.0	<2.0	<2.0
2,4-dinitrophenol		<13	<13	<13	<13	<13
4-nitrophenol		<2.8	<2.8	<2.8	<2.8	<2.8
4,6-dinitro-2-methylphenol	<16	<16	<16	<16	<16	
pentachlorophenol	<7.4	<7.4	<7.4	<7.4	<7.4	

<sup>\*</sup>Compound present below measurable detection limit.



# ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

### RESULTS OF WATER ANALYSIS FOR PHENOLS BY GC

(all results in ug/L)

U-3969.17

	E & E Lab. No. 86-	7325				
Compound	Sample Identity	9089				
phenol	<2.0					
2-chlorophenol	•					
2-nitrophenol		<2.0		ĺ	1	
2,4-dimethylphenol		<2.0		<b>j</b>		
2,4-dichlorophenol		<2.0	ł	<b> </b>		
4-chloro-3-methylphenol		<2.0	}	<b>}</b>		
2,4,6-trichlorophenol		<2.0		į į		
2,4-dinitrophenol	<13	i	<u> </u>	•		
4-nitrophenol	<2.8	l				
4,6-dinitro-2-methylphenol	<16	]	<b>[</b>			
pentachlorophenol		<7.4		·		

<sup>\*</sup>Compound present below measurable detection limit.

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# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED WATER SAMPLES

	(	(ug/L)		
E&E Lab No.: Compound DI Spike	Original Analysis	Amount Spiked	Amount Recovered	Percent Recovery
phenol	<2.0	40	35	88
2-chlorophenol	<2.0	40	23	58
2-nitrophenol	<2.0	40	38	95
2,4-dimethylphenol	<2.0	40	32	80
2,4-dichlorophenol	<2.0	40	36	90
4-chloro-3-methylphenol	<2.0	40	39	98
2,4,6-trichlorophenol	<2.0	40	38	95
2,4-dinitrophenol	<13	40	42	105
4-nitrophenal	<2.8	40	18	45
4,6-dinitro-2-methylphenol	<16	40	42	105
pentachlorophenol	<7.4	40	41	103



# QUALITY CONTROL FOR ACCURACY: PERCENT DIFFERENCE--EPA QUALITY ASSURANCE MATERIALS

•	Concentra	Concentrations in ug/L			
Parameter	Known Determin		Percent Difference		
Antimony	990	1112	12.3		
Beryllium	960	1006	4.8		
Cadmium	940	963	2.4		
Chromium	1030	1056	2.5		
Copper	1030	1042	1.2		
Lead	53.0	49.5	6.6		
Nickel	1020	1040	2.0		
Silver	6000	6152	2.5		
Thellium	25.0	25.2	0.8		
Zinc	1010	1024	1.4		



### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

	(mg/	L)	Relative
E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
7298	<0.15	<0.15	
7298	<0.01	<0.01	
7298	<0.005	<0.005	
7298	<0.05	<0.05	
7298	0.023	0.022	4.4
7298	0.019	0.020	5.1
7298	<0.1	<0.1	
7298	<0.04	<0.04	
7298	<0.20	<0.20	
7298	0.209	0.219	4.7
	7298 7298 7298 7298 7298 7298 7298 7298	E & E Laboratory No. 86- Original Analysis  7298	Laboratory No. 86-         Original Analysis         Replicate Analysis           7298         <0.15         <0.15           7298         <0.01         <0.01           7298         <0.005         <0.005           7298         <0.05         <0.05           7298         <0.05         <0.05           7298         <0.023         <0.022           7298         <0.019         <0.020           7298         <0.1         <0.1           7298         <0.04         <0.04           7298         <0.20         <0.20



# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED WATER SAMPLES



	E&E	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86-		(mg/L)		Percent Recovery
Oil and Grease	DI Spike	<0.2	7.4	9.6	130
	·				
		l			1



### SAMPLE IDENTIFICATION CROSS-REFERENCE

U-3978

255555

	<del></del>	
Laboratory Number 86-	Field Number	Field Location
7326	9114	0165-PG-008-GP-86-9114
7327	9115	0165-PG-008-GP-86-9115



SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3978.15

	Pet. HC(28)	Anal	I I
	Pet.	Dead	
	0&G(28)	Anal	9/12
	080	Dead	9/16
	(1) SQI		11
	105	Dead	11
	/818	Anal	2/6
(0)	Analysis	Dead	9/30
3/E/8	BNA(7/E + 40) Extraction Ana	Extr	8/21
		Dead	8/26
	7818	Anal	11
(5)	Analysis	Dead	
(OF , 2/7/ UAG	Extraction	Extr	1 1
	Extra	Dead	11
		Sample Date	8/18 8/19
		Sample Number	7326
		Job	3978

DEAD: EXTR: ANAL: ( ): S+#: E+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time.
Holding time expiration based on sample date.
Holding time expiration based on extraction date.



U-3978.16

SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

Analysis Extraction Analysis Extraction Analysis Extraction Analysis	Anel Dead Extr Dead Anel Dead Extr D	8/26 8/21 9/20 8/21 <del>1                                    </del>	
Herb(7/E+30) Extraction Analysis	Dead	11	
VDA(14)	Sample Date Dead Anal	6 8/19 9/2 8/21 7 8/19 9/2 8/21	VOA CONFIRMATION DATE 7326 8/21
	Job Semple	3978 7326 7327	<del></del>

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time expires.
Holding time based on sample date.
Holding time based on sample extraction. DEAD: EXIR: ANAL: S+P: E+P:



### **LABORATORY REPORT**

FOR

REESETAIR FORCE BASE

U-3978.1

Job No.: U-3978			RE:	DF-20	000	
Sample Date: 8/19/8	6		P.O. No.:	<u> </u>		
Date Received: 8/20/8	6		Sampled By: E & E, Inc.			
Sample Type: Water			Delivered	By: Feder	al Express	
E & E Lab. No. 86-	7326	7327	81 ank			
Customer No.	9114	9115				
Sample Identity						
	Results i	n: mg/L un	less noted		<b> </b>	
Oil and Grease	0.4	0.5	NA			
Antimony	<0.15	<0.15	<0.15			
Beryllium	<0.01	<0.01	<0.01			
Cadmium	<0.005	<0.005	<0.005			
Chromium	<0.05	<0.05	<0.05			
Copper	<0.02	<0.02	<0.02			
Lead	<0.005	0.038	<0.005			
Nickel	<0.1	<0.1	<0.1			
Silver	<0.04	<0.04	<0.04			
Thallium	<0.20	<0.20	<0.20			
Zine	0.101	2.91	<0.05			
		<u></u>			L	i

NA: Not Applicable

Analytical References:

"Methods for the Chemical Analysis of Water and Wastes," EPA-600/4-79-020, March 1983.

Supervising Analyst: Jan Hoh 1605
Date: September 20, 1920

## \*\*\*

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

## RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/L)

	E & E Lab. No. 86-	Blank	7326*	7327	
Compound	Sample Identity	8/21/86	9114	9115	
chlorobenzene		<0.20	<0.20	<0.20	
1,2-dichlorobenzene		<0.40	<0.40	<0.40	
1,3-dichlorobenzene		<0.40	<0.40	<0.40	
1,4-dichlorobenzene		<0.30	<0.30	<0.30	
benzene		<0.20	<0.20	<0.20	
total xylenes		<1.0	<1.0	<1.0	
toluene		<0.20	1.0	<0.20	
ethylbenzene		<0.20	<0.20	<b>&lt;0.</b> 20	

<sup>\*</sup>Sample confirmed-results positive



	Parameter  chlorobenzene 1,2-dichlorobenzene 1,4-dichlorobenzene 1,4-dichlorobenzene benzene total xylenes	<u> </u>	, Cold of Diable (S. E. A.	tinabatnabatha	<del>( Party and and and an</del>	<del>Derbert er (Stein er (Ste</del>
*						
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XX						· • • • • • • • • • • • • • • • • • • •
×						
50	QUA Resu	LITY CONTROL F LTS OF ANALYSI	OR PRECISION S OF REPLICA	I ITE		
	A	NALYSES OF WAT	ER SAMPLES			
					U-3978.3	
Γ			(u	ıg/L)	<b>.</b>	
		E & E	Oniciael	Roolingto	Relative Percent	
	Parameter	No. 86-	Analysis	Analysis	(RPD)	
<b>K</b>	chlorobenzene	7327	<0.20	<0.20		
8	1,2-dichlorobenzene	7327	<0.40	<0.40		}
<b>X</b>	1,3-dichlorobenzene	7327	<0.40	<0.40		
<b>8</b> 8	1,4-dichlorobenzene	7327	<0.30	<0.30		1
	benzene	7327	<0.20	<0.20		-
	total xylenes	7327	<1.0	<1.0	_ <del></del>	
	toluene ethyl benzene	7327 7327	<0.20 <0.20	<0.20 <0.20		
<u>&amp;</u> ∟	- Congression					j
×						
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## 63

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

## RESULTS OF WATER ANALYSIS FOR PHENOLS BY GC

(all results in ug/L)

	E & E Lab. No. 86-	Blank	7326	7327		
Compound	Sample Identity	8/21/86	9114	9115		
phenol		<2.0	<2.0	<2.0		
2-chlorophenol		<2.0	<2.0	<2'.0		
2-nitrophenol		<2.0	<2.0	<2.0	ŀ	
2,4-dimethylphenol		<2.0	<2.0	<2.0	Í	{
2,4-dichlorophenol		<2.0	<2.0	<2.0		
4-chloro-3-methylphenol		<2.0	<2.0	<2.0		Ì
2,4,6-trichlorophenol		<2.0	<2.0	<2.0	ľ	j
2,4-dinitrophenol		<13	<13	<13		l
4-nitrophenol		<2.8	<2.8	<2.8	ł	}
4,6-dinitro-2-methylphenol		<16	<16	<16	]	
pentachlorophenol		<7.4	<7.4	<7.4	]	

<sup>\*</sup>Compound present below measurable detection limit.

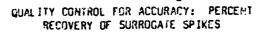


### ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

## RESULIS OF WATER ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

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ANAL	Y I I C A L	S E R V I	CES CE	NTER	
	S OF WATER ANA	YSIS FOR P	RIORITY POL	LUTANI	
	ACID EXTRACTA	esults in u		•	
	(811 1	esulta III u	g/ L /		
	E & E Lab.	7704	77.27	Method	
	No. 86-	7326	7327	Blank	
Compound	Sample Identity	9114	9115		
Compound	- Juliant Ly	7114	,,,,	<b>  </b>	
phenol		<10	<10	<10	
2-chlorophenol		<10	<10	<10	
2-nitrophenol 2,4-dimethylphenol		<10 <10	<10 <10	<10 <10	
2,4-dichlorophenol		<10	<10	<10	
4-chloro-3-methylphenol		<10	<10	<10	
2,4,6-trichlorophenol 2,4-dinitrophenol		<10 <30	<10 <30	<10 <30	
4-nitrophenol		<10	<10	<10	
			1		
4,6-dinitro-2-methylphenol		<30	<30	<b>&lt;30</b>	
	!		1	<30 <30	
4,6-dinitro-2-methylphenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		
4,6-dinitro-2-methylphenol pentachlorophenol	ole detection l	<30 <30	<30		

<sup>\*</sup>Compound present below measurable detection limit.



U-3978.6

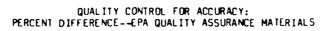
	E & E	Amount Added	Arount Determined	
Compound	Laboratory No. 86-	(	ug/L)	Parcent Recovery
nitrobenzene-D5	7326	100	67	67
	7327	100	77	77
2-fluorobiphenyl	7325	160	73	73
	7327	100	74	74
terphenyl-D14	7326	100	<b>51</b>	51
	7327	100	55	<b>55</b>
phenol D5	7326	200	64	32
	7327	200	68	24
2-fluorophenol	7326	200	102	51
	7 <b>327</b>	200	67	32.3
2,4,6-tribramophenol	7326 7327	200 200	141	73 52

These recoveries are acceptable to EPA Contract Lab Program (CUP) guide-lines.

# QUALITY CONTROL FOR PRECISION RESULTS OF ANNLYSIS OF REPULCATO ANALYSES OF WATER SAMPLES

U-3978.7

	µg/L		<b>19/</b> L	Relativa
Compound	E & E Lab. No. 86-	Original Analysis	deplicate Analysia	Percent Difference (RFD)
phenol		<10	<10	
2-chlorophenol		<10	<10	
2-nitrophenol		<10	<10	
2,4-dimathylphenol		<10	<10	
2,4-dichloruphenal		<10	<10	
4-chloro-3-methylphenol	·	<10	<10	
2,4,6-trichlorophenol		<10	<10	
2,4-dinitrophenol		<b>&lt;3</b> 0	<30	
4-nitrophenol		<b>&lt;10</b>	<10	
4.6-dinitro-2-methylphenol		<b>&lt;3</b> 0	<b>(3</b> 0	
pent achlor ophenol		<b>(3</b> 0	<30	



•				
Parameter	Known	Determined	Percent Difference	
Antimony	990	1112	12.3	
Beryllium	960	1006	4.8	
Cadmium	940	963	2.4	
Chromium	1030	1056	2.5	
Copper	1030	1042	1.2	
Lead	53.0	49.5	6.6	
Nickel	1020	1040	2.0	
Silver	6000	6152	2.5	
Thallium	25.0	25.2	0.8	
Zinc	1010	1024	1.4	
			Ì	



PERSONAL BANKSON PERSONS

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

# RESULTS OF WATER ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/L)

U-3978.9

	E & E Lab. No. 86-	Blank	7326	7327			
Compound	Sample Identity	8/21/86	9114	9115			
carbon tetrachloride		<0.12	<0.12	<0.12			
1,2-dichloroethane		<0.03	<0.03	<0.03			
1,1,1-trichloroethane		<0.03	<0.03	<0.03	ŀ		[
1,1-dichloroethane		<0.07	<0.07	<0.07			į
1,1,2-trichloroethane		<0.02	<0.02	<0.02	1		
1,1,2,2-tetrachloroet	hane	<0.03	<0.03	<0.03	ţ		ĺ
chloroethane		<0.52	<0.52	<0.52	ł		ł
2-chloroethylvinyl et	her	<0.13	<0.13	<0.13	ł	f	1
chloroform	,	<0.05	<0.05	<0.05	<b>[</b>	}	}
1,1-dichloroethene		<0.13	<0.13	<0.13	1	Ī	ľ
trans-1,2-dichloroeth	ene	<0.10	<0.10	<0.10			i
1,2-dichloropropane		<0.04	<0.04	<0.04	ļ	ļ	ļ
trans-1,3-dichloropro	pene	<0.34	<0.34	<0.34	j	ļ	i
cis-1,3-dichloroprope	ne	<0.20	<0.20	<0.20		Į	1
methyrene chloride		<0.25	<0.25	<0.25	1	•	ĺ
chloromethane		<0.08	<0.08	<0.08	•		
bromometh <b>ane</b>		<1.18	<1.18	<1.18	]	İ	1
bromoform		<0.20	<0.20	<0.20	j	1	1
bromodichloromethane		<0.10	<0.10	<0.10	l	İ	f
fluorotrichloromethan	-	<2.0	<2.0	<2.0		1	
dichlorodifluorometha	ine	<1.81	<1.81	<1.81	1	ĺ	1
chlorodibromomethane		<0.09	<0.09	<0.09	[	{	ĺ
tetrachloroethen <b>e</b>		<0.03	<0.03	<0.03	İ	[	[
trichloroethene		<0.12	<0.12	<0.12			
vinyl chloride		<n.18< td=""><td>&lt;0.18</td><td>&lt;0.18</td><td></td><td></td><td></td></n.18<>	<0.18	<0.18			



### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

		(ug/L)		Relative
Compound	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
carbon tetrachloride	7327	<0.12	<0.12	
1,2-dichloroethane	7327	<0.03	<0.03	<u></u>
1,1,1-trichloroethane	7327	<0.03	<0.03	i
1,1-dichloroethane	7327	<0.07	<0.07	l
1,1,2-trichloroethane	7327	<0.02	<0.02	
1,1,2,2-tetrachloroethane	7327	<0.03	<0.03	l
chloroethane	7327	<0.52	<0.52	
2-chloroethylvinyl ether	7327	<0.13	<0.13	ļ <u></u>
chloroform	7327	<0.05	<0.05	
1,1-dichloroethene	7327	<0.13	<0.13	
trans-1,2-dichloroethene	7327	<0.10	<0.10	j
1,2-dichloropropane	7327	<0.04	<0.04	
trans-1,3-dichloropropene	7327	<0.34	<0.34	
cis-1,3-dichloropropene	7327	<0.20	<0.20	]
methylene chloride	7327	<0.25	<0.25	
chloromethane	7327	<0.08	<0.08	
bromomethane	7327	<1.18	<1.18	
bromoform	7327	<0.20	<0.20	
bromodichloromethane	7327	<0.10	<0.10	
fluorotrichloromethane	7327	<2.0	<2.0	
dichlorodifluoromethane	7327	<1.81	<1.81	
chlorodibromomethane	7327	<0.09	<0.09	
tetrachloroethene	7327	<0.03	<0.03	
trichloroethene	7327	<0.12	<0.12	
vinyl chloride	7327	<0.18	<0.18	

### ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

### RESULIS OF WATER ANALYSIS FOR PRIORITY POLLUTANI BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/L)

				<del></del>	l	1
	E & E Lab. No. 86-	7326	7327	Method Blank		
Compound	Sample Identity	9114	9115			
bis(2-chloroethy1)ether		<b>&lt;10</b>	<10	<10		
1,3-dichlorobenzene		<10	<10	<10		1
1,4-dichlorobenzene		<10	<10	<10	ł	
1,2-dichlorobenzene		<10	<10	<10		
bis(2-chloroisopropyl)ether		<10	<10	<10	İ	
N-nitrosodipropylamine		<10	<10	<10		<u> </u>
hexachloroethane		<10	<10	<10		
nitrobenzene		<10	<10	<10		Į
isophorone		<10	<10	<10		
bis(2-chloroethoxy)methane		<10	<10	<10	Í	
1,2,4-trichlorobenzene		<10	<10	<10	]	İ
naphthalene		<10	<10	<10		
hexachlorobutadiene		<10	<10	<10 <10		i
hexachlorocyclopentadiene		<10	<10	<10		
2-chloronaphthalene		<10	<10	<10		
dimethyl phthalate		<10	<b>K10</b>	<b>&lt;10</b>	l .	l .
acenaphthylene		<10	<10	<10	1	
fluorene		<10	<10	<10		i
acenaphthene		<10	<10	<10		
2,4-dinitrotoluene		<10	<10 <10	<10 <10		ŀ
2,6-dinitrotoluene		<10	<10	<10		
diethylphthalate		<10	<10	<10		ļ
4-chlorophenyl phenyl ether		<10	<10	<10		]
N-nitrosodiphenylamine		<10	<10	<10	Ì	İ
4-bromophenyl phenyl ether		<10	<10	₹10		
hexachlorobenzene		<10	<10 <10	<10		l
phenanthrene		<10	<b>ζ10</b>	<10		1
anthracene		<10	<10 <10	<10		i
di-n-butyl phthalate		₹10	₹10	<10	1	l
fluoranthene		<10	<10	<10 <10		
benzidine		<b>1 350</b>	<50	<50		[
pyrene		<10	<b>₹10</b>	<10		
butyl benzyl phthalate		<10	<10	<10	]	l
3,3'-dichlorobenzidine		<30	<b>&lt;30</b>	<30	l	]
benzo(a)anthracene		<10	₹10	<10		i
bis(2-ethylhexyl)phthalate		<10	<10	<10	}	
Chrysene		<10	<10	<10		İ
di-n-octyl phthalate		<10	₹10	<10		
benzo(b)fluoranthene		<b>&lt;10</b>	<10	<10 <10		<u> </u>
benzo(k)fluoranthene		<10	<10 <10	<10		
benzo(a)pyrene		<10	<10 <10	<10 <10		
indeno(1,2,3-cd)pyrene		<10	<10 <10	<10	l	!
dibenzo(a,h)anthracene		<10	<10	<10		
benzo(ghi)perylene		<10	<10 <10	<10 <10		
		l`	110	\$10		

<sup>\*</sup>Compour' present below measurable detection limit.

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

		ug/L		Relative
Compound	E & E Lab. No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
bis(2-chloroethyl)ether		<10	<10	
1,3-dichlorobenzene		<10	<10	
1,4-dichlorobenzene		<10	<10	
1,2-dichlorobenzene		<10	<10	
bis(2-chloroisopropyl)ether		<10	<10	
N-nitrosodipropylamine		<10	<10	
hexachloroethane		<10	<10	
nitrobenzene	1	<10	<10	
isophorone		<10	<10	
bis(2-chloroethoxy)methane		<10	<10	
1,2,4-trichlorobenzene		<10	<10	
naphthalene		<10	<10	
hexachlorobutadiene		· <10	<10	
hexachlorocyclopentadiene		<10	<10	
2-chloronaphthalene		<10	<10	
dimethyl phthalate		<10	<10	
acenaphthylene		<10	<10	
fluorene		<10	<10	
acenaphthene		<10	<10	
2,4-dinitrotoluene		<10	<10	
2,6-dinitrotoluene		<10	<10	
diethylphthalate		<10	<10	
4-chlorophenyl phenyl ether		<10	<10	
N-nitrosodiphenylamine		<10	<10	
4-bromophenyl phenyl ether		<10	<10	
hexachlorobenzene		<10	<10	
phenanthrene		<10	<10	
anthracene		<10	<10	
di-n-butyl phthalate		<10	<10	
fluoranthene		<10	<10	
benzidine		<50	<50	
pyrene		<10	<10	
butyl benzyl phthalate		<10	<10	
3,3'-dichlorobenzidine		<30	<30	
benzo(a)anthracene		<10	<10	
bis(2-ethylhexyl)phthalate		<10	<10	
chrysene		<10	<10	
di-n-octyl phthalate		<10	<10	
benzo(b)fluoranthene		<10	<10	
benzo(k)fluoranthene		<10	<10	
benzo(a)pyrene		<10	<10	_
indeno(1,2,3-c,d)pyrene		<10	<10	
dibenzo(a,h)anthracene benzo(g,h,i)perylene		<10 <10	<10 <10	
neuro/ d*ii*T / her Areise		710	\1U	<del></del>
<del></del>			<del></del>	<del></del>

### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

U-3978.13

SAMINGGOOD SECRECO BEEEEES SELECTED ELECTOR BEEEEES

		(п	ng/L)	Relative
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Cadmium	7298*	<0.005	<0.005	
Chromium	7298*	<0.05	<0.05	
Copper	7298*	0.023	0.022	4.4
Lead	7298*	0.019	0.020	5.1
Nickel	7298*	<0.1	<0.1	
Zinc	7298*	0.209	0.219	4.7

<sup>\*</sup>This represents 10% QC. This is not one of your samples but was analyzed in the same batch as your samples.



## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED WATER SAMPLES

	E & E	Original Value	Amount Added	Amount Determined	
- Parameter	Laboratory No. 86-		(mg/L)		Percent Recovery
Oil and Grease	D.I. Spike	<0.2	7.4	10.3	139
					·
•					



## SAMPLE IDENTIFICATION CROSS-REFERENCE

U-3772

Laboratory Number 86-	Field Number	Field Location
5760	9116	0165-S0-009-GS-86-9116
5761	9117	0165-S0-009-GS-86-9117
5762	9118	0165-S0-009-GS-86-9118
5763	9119	0165-S0-009-GS-86-9119
5764	9120	0165-S0-009-GS-86-9120
5765	9121	0165-S0-009-GS-86-9121
5766	9122	0165-S0-009-GS-86-9122
5767	9123	0165-S0-009-GS-86-9123
5768	9124	0165-S0-009-GS-86-9124
5769	9125	0165-S0-009-GS-86-9125
5770	9126	0165-S0-009-GS-86-9126
5771	9127	0165-S0-009-GS-86-9127



### SAMPLE IDENTIFICATION CROSS-REFERENCE

Laboratory Number 86-	Field Number	Field Location
5772	9128	0165-S0-009-GS-86-9128
5773	9129	0165-S0-009-GS-86-9129
5774	9130	0165-S0-009-GS-86-9130
5775	9131	0165-S0-009-GS-86-9131
5776	9132	0165-S0-009-GS-86-9132
5777	9133	0165-S0-009-GS-86-9133
5778	9134	0165-S0-009-GS-86-9134
5779	9135	0165-S0-009-GS-86-9135
5780	9136	0165-S0-009-GS-86-9136
5781	9137	0165-S0-009-GS-86-9137

SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

	_	_		_	_		_	_	_	_		_	_	_	_	_				_	_		_			 			
	818	Anel	;	1	1	:	;	;	!	1	;	;	;	1	:	ł	;	:	ł	:	;	:	;	1					
(E+30)	Analysis	Dead	1	!	;	:	:	!	:	!	;	:	ţ	:	;	;	;	i	;	;	;	;	-	;				•	
Phenola(7/E+30)	Extraction	Extr	-	;	1	1	1	!	:	1	;	:	1	1	;	;	;	1	1	1	1	;	1	1					
ÆI		Dead	1	;	1	;	1	:	:	1	;	;	1	1	;	1	;	ł	!	!	1	!	!	:					
al	Analysis	Anal	ŀ	!	1	1	:	1	1	1	1	1	:	1	1	;	1	:	1	;	1	1	1	1					
Organophos(7/5+14)		Dead	;	;	;	;	;	;	;	;	;	;	!	!	:	;	;	;	;	1	;	!	;	;					
anophoe	Extraction	Ext	ŀ	:	!	1	;	:	1	1	1	1	1	!	1	1	1	1	1	!	1	;	1	!					
히	Extre	Dead	 	:	:	!	1	1	!	;	!	1	:	1	1	!	1	!	!	!	1	1	1	!					
ام	Analysis	Anel	1	!	1	1	i	!	;	ŀ	i	ł	;	!	!	1	!	1	1	:	!	1	!	1					
(7/E+40)	Ana	Dead	!	!	1	1	:	1	:	;	1	1	1	-	1	1	ł	:	;	!	!	!	1	!					
Pest/PCB(7/E+40)	Extraction	Extr	1	1	!	:	1	1	;	!	!	:	1	 	!	!	1	!	!	1	;	:	1	¦ 					
ه ا	Extra	Dead	-	:	1	-	;	!	!	;	!	;	1	 	1	;	1	1	!	1	1		!	1					
i i	Analysis	Anal	1	:	;	:	!	1	1	1	1	1	1	:	1	;	;	!	!	1	1	1	1	!					
Herb(7/E+30)	Ana	r Dead	-	-	!	-	!	<u> </u>	  -	1	!	!	1	1	!	1	;	ŀ	!		:	1	<b>!</b>	!	· <u>····</u>	 			
Herb(7	Extraction	EX.	 	-	!	!	!	-	!	!	-	!	-	!	-	-	:	!	-	!	!	 	1	! —		 			
	Ext	Dead	!		  -			!																					
	VOA(14)	Anal	7/25,30	7/25,30	7/25,30	7/25,30	7/25,30	7/25,30	7/25,30	7/25,30	7/25,30	7/26,30	7/26,30	7/26,30	7/26,30	7/26,30	7/26,30	7/26.31	7/26,31	7/28,31	7/28,31	7/28,31	7/28,31	7/28,31					
	VOA	Dead	8/7	8/7	8/7	8/1	8/1	8/1	8/7	8/7	8/1	8/7	8/7	8/7	8/1	1/8	6/1	8/7	8/7	8/7	8/1	8/1	8/7	8/7			•		
	Samole	Date	7/24	7/24	7/24	7/24	7/24	7/24	7/24	1/24	7/24	7/24	7/24	7/24	1/24	7/24	1/24	7/24	7/24	7/24	7/24	7/24	7/24	1/24					
	Samole	Number	5760	5761	5762	5763	5764	5765	5766	5767	5768	5769	5770	5771	5772	5773	5774	5775	5776	5777	5778	5779	5780	5781					
	qu		3772			•										Н	-;	34	.8			_				 			

DEAD:
EXTR:
ANAL:
( ):
S+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time expires.
Holding time based on sample date.
Holding time based on sample extraction.





SOOR ESSESSE RECESSED DEDUCAL SOOR

SHEKING MICHIGAL KREEKEN MANDAM POROME HAKKOK ING



SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3772.45

_		_			_	_	_		_		_				_	_	_	_		_	_	_	_	_			_	_	_	_	
		Pet. HC(28)	Anal	!	1	i	1	!	1	!	1	!	ŀ	ł	1	1	1	1	1	1	1	1	;	1	;						
		Pet.	Dead	1	}	ł	;	ł	!	ł	ł	?	1	ł	1	!	!	1	ł	?	1	1	ł	1	1						
		04G(28)	Anal	1/28	7/78	7/28	7/28	7/28	7/28	1/28	7/28	1/28	7/28	7/28	1/28	7/28	1/28	7/28	7/28	1/28	1/28	1/28	1/28	7/28	7/28						
		990	Dead	8/21	8/21	8/21	8/21	8/21	8/21	8/21	8/21	8/21	8/21	8/21	8/21	8/21	8/21	8/21	8/21	8/21	8/21	8/21	8/21	8/21	8/21						
	_	TDS (7)	Anal	;	ļ	1	1	;	:	;	;	1	ŀ	i	1	1	1	-	;	1	1	i	1	1	;						
		5	Dead	;		1	1	ł	ł	ł	!	1	:	1	1	;	ï	ŀ	1	;	!	!	i	!	;	-			•		
		увів	Anal	8/11	7/8	, <u>k</u>	8/8	8/8	9/8	8/11	8/8	9/8	8/8	9/8	9/8	9/8	9/8	9/8	8/26	9/26	8/26	8/26	8/26	8/27	8/27						
	E + 40)	Analysis	Dead	9/3	· /o	\ \ \ \	33	9/3	9/3	9/3	9/3	9/3	9/3	9/3	9/3	9/3	9/3	9/3	1/6	2/6	1/6	1/6	1/6	1/6	1/6						
	BNA(14/E + 40)	ction	Extr	7/25	7/25	7/25	7/25	7/25	7/25	7/25	7/25	7/25	1/25	7/25	7/25	1/25	7/25	7/25	1/29	1/29	1/29	1/29	1/29	1/29	7/29						
		Extraction	Dead	7/8	7/4	) d	9/4	8/7	8/7	6/7	8/7	1/8	8/7	8/7	8/7	8/1	8/7	8/1	6/1	6/7	8/7	8/7	8/1	8/7	1/8						
		Analysis	Anal	1			! :	ŀ	i	1	;	!	!	!	;	ł	-	1	1	ŀ	1	1	ļ	ł	1						
	\$ + 30)	Ana	Dead					1	ļ	ł	1	ł	1	ł	1	!	1	1	1	;	1	1	1	- 	1						
	PAH (7/5 + 30)	ction	Extr	1		<u> </u>		-	1	ŀ	ł	;	ł	1	1	;	1	ŀ	!	-	;	!	1	}	1						
	-•	Extraction	Dead	1		:		ŀ	1	ł	ŀ	!	1	!	1	;	-	ł	!	ł	!	1	1	1	!						
		,	Sample	7/74	1/2/	76/1	7//	7/24	7/24	7/24	7/24	7/24	7/24	7/24	7/24	7/24	7/24	7/24	7/24	7/24	7/24	7/24	7/24	7/24	1/24						
		,	Semple	0775	27.00	2/01	20/6	57.64	5765	5766	5767	5768	5769	5770	5771	5772	5773	5774	5775	5776	5777	5778	5779	5780	5781						
			gog	2777			•												•				•			, -,					

DEAD: EXTR: ANAL: ( ): S+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time.
Holding time expiration based on sample date.
Holding time expiration based on extraction date.



### LABORATORY REPORT

## FOR REESE AIR FORCE BASE

U-3772.2

Jab No.: U-3772			RE:	DF-20	00	
Sample Date: 7/24/8	6		P.O. No.:			
Date Received: 7/25/8	6		Sampled B	y: E&E	, Inc.	
Sample Type: Soil			Delivered	By: Feder	al Express	
E&ELab. No. 86-	5760	5761	5762	5763	5764	5765
Customer No.	9116	9117	9118	9119	9120	9121
Sample Identity						
	Results i	n: mg/kg u	nless noted			
Oil and Grease	2940	1520	2190	1620	500	170
Arsenic	1.28	<5.2†	1.46	<5.2†	<5.2t	<5 <b>.2</b> †
Cadmium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	7.43	9.50	8.57	7.10	9.71	10.3
Copper	3.38	5.66	4.77	6.31	6.96	7.60
Lead	<5.2t	<5 <b>.</b> 2†	<5 <b>.2</b> †	67.3	22.2	8.99
Nickel	<10	<10	<10	<10	<10	<10
Zinc	15.6	24.1	19.8	33.7	29.9	30.5
Solids, %	93	94	94	96	94	87

tElevated detection limit due to matrix interference.

### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Autohykor

Date: Suptember 1984



### LABORATORY REPORT

## FOR REESE AIR FORCE BASE

U-3772.3

Job No.: U-3772			RE:	DF-20	00						
Sample Date: 7/24/8	6		P.O. No.:								
Date Received: 7/25/8	6		Sampled By: E & E, Inc.								
Sample Type: Soil			Delivered	By: Feder	al Express						
E & E Lab. No. 86-	5766	5767	5768	5769	5770	5771					
Customer No.	9122	9123	9124	9125	9126	9127					
Sample Identity											
	Results i	n: mg/kg u	nless noted								
Oil and Grease	4080	2620	190	740	670	160					
Arsenic	<5 <b>.2</b> †	<5 <b>.2</b> †	<5 <b>.2</b> †	<5 <b>.2</b> †	<5.2†	<5 <b>.2</b> †					
Cadmium	<0.5	<0.5	<0.5	1.15	0.865	<0.5					
Chromium	8.02	12.4	12.4	8.59	10.6	9.62					
Copper	4.48	7.81	8.41	9.45	9.39	8.18					
Lead	6.04	60.8	21.5	68.7	69.5	27.5					
Nickel	<10	<10	<10	<10	<10	<10					
Zinc	19.2	42.0	33.9	38.8	47.4	37.6					
Solids, %	90	92	93	97	96	93					

tElevated detection limit due to matrix interference.

### Analytical References:

"Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater," EPA-600/4-82-057, July 1982.

Supervising Analyst: <u>Aug tah Ko</u> Date: <u>Supermound</u>, 1984



### LABORATORY REPORT

FOR

### REESE AIR FORCE BASE

U-3772.4

Job No.: U-3772	•		RE:	DF-20	00	
Sample Date: 7/24/8	6		P.O. No.:	·		
Date Received: 7/25/8	6		Sampled 8	y: E&E	, Inc.	······································
Sample Type: Soil			Delivered	By: Feder	al Express	
£ & £ Lab. No. 86-	5772	5773	5774	5775	5776	5777
Customer No.	9128	9129	9130	9131	9132	9133
Sample Identity						
,	Results i	n: mg/kg u	nless noted			
Oil and Grease	<100	260	350	140	140	160
Arsenic	<5 <b>.</b> 2†	<5 <b>.2</b> †	<5.2t	<5 <b>.</b> 2†	<5.2t	<5 <b>.2</b> †
Cadmium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	13.7	8.33	12.1	12.4	9.49	9.53
Copper	8.89	7.06	8.29	8.25	7.84	7.85
Lead	12.8	17.2	21.0	12.0	38.7	10.1
Nickel	10.8	<10	<10	<10	<10	<10
Zinc	36.1	28.0	34.2	47.5	42.7	34.7
Solids, %	92	96	95	96	96	95

tElevated detection limit due to matrix interference.

#### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Say fam 1000 Date: Supervising (6, 1976)



### LABORATORY REPORT

## FOR REESE AIR FORCE BASE

U-3772.5

Job No.: U-3772			RE:	DF-20	00						
Sample Date: 7/24/8	6		P.O. No.:								
Date Received: 7/25/8	6		Sampled By: E & E, Inc.								
Sample Type: Soil			Delivered	By: Feder	al Express						
E&ELab. No. 86-	5778	5779	5780	5781	Blank*						
Customer No.	9134	9135	9136	9137							
Sample Identity											
	Results i	n: mg/kg u	nless noted								
Oil and Grease	160	140	260	<100	NA						
Arsenic	<5 <b>.2</b> †	<5.2†	<5 <b>.2</b> †	<5 <b>.2</b> †	<0.005						
Cadmium	<0.5	<0.5	<0.5	<0.5	<0.005						
Chromium	10.6	9.82	10.8	9.48	<0.05						
Copper	8.00	7.71	8.53	7.74	<0.02						
Lead	31.1	19.9	16.8	9.90	<0.005						
Nickel	<10	<10	<10	<10	<0.1						
Zine	31.3	28.2	32.9	28.1	<0.05						
Solids, %	94	95	94	94	NA NA						

<sup>#</sup>mg/L

NA-not applicable

#### Analytical References:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,"SW-846, Second Edition, U.S. EPA, 1982.

Supervising Analyst: Say Jah / Ks

Date: Systember (2) 974

<sup>†</sup>Elevated detection limit due to matrix interference.

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

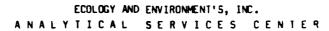
# RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg as received)

	E & E Lab. No. 86-	Blank	Blank	Blank	Blank	5760	5761
Compound	Sample Identity	7/25/86	7/25/86	7/26/86	7/28/86	9116	9117
carbon tetrachloride		<250	<250	<250	<250	<250	<250
1,2-dichloroethane		<100	<100	<100	<100	<100	<100
1,1,1-trichloroethane		<250	<250	<250	<250	<250	<250
1,1-dichloroethane	į	<100	<100	<100	<100	<100	<100
1,1,2-trichloroethane	,	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloroet	hane	<250	<250	<250	<250	<250	<250
chloroethane		<500	<500	<500	<500	<500	<500
2-chloroethylvinyl et	ther	<5000	<5000	<5000	<5000	<5000	<5000
chloroform		<250	<250	<250	<250	<250	<250
1,1-dichloroethene	į	<100	<100	<100	<100	<100	<100
trans-1,2-dichloroeth	nen <b>e</b>	<100	<100	<100	<100	<100	<100
1,2-dichloropropane	į	<1000	<1000	<1000	<1000	<1000	<1000
trans-1,3-dichloropro	opene	<1000	<1000	<1000	<1000	<1000	<1000
cis-1,3-dichloroprope	ene	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride		<50	<50	<50	<50	<50	<50
chloromethane		<500	<500	<500	<500	<500	<500
bromomethan <b>e</b>		<500	<500	<500	<500	<500	<500
bromofo <b>rm</b>		<100 <b>0</b>	<1000	<1000	<1000	<1000	<1000
bromodichloromethane		<250	<250	<250	<250	<250	<250
fluorotrichlorometha	ne	<500	<500	<500	<500	<500	<500
dichlorodifluorometh	ane	<50 <b>0</b>	<500	<500	<500	<500	<500
chlorodibromomethane		<250	<250	<250	<250	<250	<250
tetrachloroethene		<250	<250	<250	<250	<250	<250
trichloroethene		<250	<250	<250	<250	<250	<250
vinyl chloride		<500	<500	<500	<500	<500	<500

# ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

# RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg as received)

	E & E Lab. No. 86-	5762	5763	5364	5765	5766	5767
Compound	Sample Identity	9118	91 19	9120	9121	9122	9123
carbon tetrachloric	le	<250	<250	<250	<250	<250	<250
1,2-dichloroethane	İ	<100	<100	<100	<100	<100	<100
1,1,1-trichloroethe	ane	<250	<250	<250	<250	<250	<250
1,1-dichloroethane	į	<100	<100	<100	<100	<100	<100
1,1,2-trichloroethe	ine	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloro	ethane	<250	<250	<250	<250	<250	<250
chloroethane		<500	<500	<500	<500	<500	<500
2-chloroethylvinyl	ether	<5000	<5000	<5000	<5000	<5000	<5000
chloroform	1	<250	<250	<250	<250	<250	<250
1,1-dichloroethene		<100	<100	<100	<100	<100	<100
trans-1,2-dichloro	ethene	<100	<100	<100	<100	<100	<100
1,2-dichloropropane	,	<1000	< 1000	<1000	<1000	<1000	<1000
trans-1,3-dichlorop	ropene	<1000	<10.00	<1000	<1000	< 1000	<1000
cis-1,3-dichloropro	opene	<1000	<1000	<1000	<1000	<1000	<1000
methylene chloride	[	<50	<50	<50	<50	<50	<50
chloromethane		<500	<500	<500	<500	<500	<500
bromomethane	1	<500	<500	<500	<500	<500	<500
bromoform		<1000	<1000	<1000	<1000	<1000	<1000
bromodichlorometha	ne i	<250	<250	<250	<250	<250	<250
fluorotrichloromet	nane	<500	<500	<500	<500	<500	<500
dichlorodifluorome	thane	<500	<500	<500	<500	<500	<500
chlorodibromometha	ne	<250	<250	<250	<250	<250	<250
tetrachloroethene	j	<250	<250	<250	<250	<250	<250
trichloroethene		<250	<250	<250	<250	<250	<250
vinyl chloride	ł	<500	<500	<500	<500	<500	<500



# RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALDCARBON COMPOUNDS BY GC (all results in ug/kg as received)

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i S		E	COLOGY AND	<b>ENVIRONMENT</b>	'S, INC.			
Š		ANALYT	ICAL	SERVIC	ES CE	NTER		
1			REGISTS OF	SOIL ANALY	SIS FOR			
5		PUR	GEABLE HALD	CARBON COMP	OUNDS BY GC	• •		
Ŷ				in ug/kg as				
<b>^</b>								U-3772.8
÷								
	ļ	E & E Lab. No. 86-	5768	5769	5770	5771	5772	5773
4			,,,,,	3,0,	2770			
	<b>j</b>	Samula						
<del>,</del>	Compound	Sample Identity	9124	9125	9126	9127	9128	9129
ő	carbon tetrachloride		<250	<250	<250	<250	<250	<250
İ	1,2-dichloroethane	Î	<100	<100	<100	<100	<100	<100
3	1,1,1-trichloroethane		<250	<250	<250	<250	<250	<250
₩ •   •	1,1-dichloroethane		<100	<100	<100	<100	<100	<100
<u>,</u>	1,1,2-trichloroethane	e	<500	<500	<500	<500	<500	<500
•	1,1,2,2-tetrachloroet		<250	<250	<250	<250	<250	<250
, e	chloroethane		<500	<500	<500	<500	<500	<500
1	2-chloroethylvinyl et	ther	<5000	<5000	<b>(5000</b>	<5000	<b>&lt;5000</b>	<5000
7	chloroform		<250	<250	<250	<250	<250	<250
d C	1,1-dichloroethene		<100	<100	<100	<100	<100	<100
} {	trans-1,2-dichloroeth	nene	<100	<100	<100	<100	<100	<100
i	1,2-dichloropropane	ł	<1000	<1000	<1000	<1000	<1000	<1000
\$	trans-1,3-dichloropro	opene	<1000	<1000	<1000	<1000	<1000	<1000
ì	cis-1,3-dichloroprope	en <b>e</b>	<1000	<1000	<1000	<1000	<1000	<1000
5	methylene chloride	į	<50	<50	<50	<50	<50	<50
3	chloromethane	ł	<500	<500	<500	<500	<500	<500
2	bromomethane		<500	<500	<500	<500	<500	<500
S	bromoform		<1000	<1000	<1000	<1000	<1000	<1000
Received.	bromodichloromethane		<250	<250	<250	<250	<250	<250
₽ <b>L</b>	fluorotrichloromethane		<500	<500	<500	<500	<500	<500
	dichlorodifluoromethane		<500 <250	<500	<500	<500	<500	<500
k1 M W	chlorodibromomethane	1		<250	<250	<250	<250	<250
<u>Ţ</u>	tetrachloroethene		<250	<250	<250	<250	<250	<250
	trichloroethene		<250	<250	<250	<250	<250	<250
[	vinyl chloride	i	<500	<500	<500	<500	<500	<500
G	<b>!</b>		<b></b> _	l		ļ <u>.</u>		



## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

# RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg as received)

	E & E Lab. No. 86-	5774	5775	5776	5777	5778	5779
Compound	Sample Identity	9130	9131	9132	9133	9134	9135
carbon tetrachloric	le	<250	<250	<250	<250	<250	<250
1,2-dichloroethane	j	<100	<100	<100	<100	<100	<100
1,1,1-trichloroethe	ine	<250	<250	<250	<250	<250	<250
1,1-dichloroethane	·	<100	<100	<100	<100	<100	<100
1,1,2-trichloroethe	ine	<500	<500	<500	<500	<500	<500
1,1,2,2-tetrachloro	ethane	<250	<250	<250	<250	<250	<250
chloroethane	j	<500	<500	<500	<500	<500	<500
2-chloroethylvinyl	ether	<5000	<5000	<5000	<5000	<5000	<500
chloroform	j	<250	<250	<250	<250	<250	<250
1,1-dichloroethene	j	<100	<100	<100	<100	<100	<100
trans-1,2-dichlorne	thene	<100	<100	<100	<100	<100	<100
1,2-dichloropropane	•	<1000	<1000	<1000	<1000	<1000	<100
trans-1,3-dichlorop	ropen <b>e</b>	< 1000	<1000	<1000	<1000	<1000	<100
cis-1,3-dichloropro	ppen <b>e</b>	<1000	<1000	<1000	<1000	<1000	<100
methylene chloride		<50	<50	<50	<50	<50	<50
chloromethan <b>e</b>		<500	1500	<500	<500	<500	<500
bromomethan <b>e</b>	1	<500	<500	<500	<500	<500	<500
bromoform		<1000	<1000	<1000	<1000	<1000	<100
bromodichlorometha	ne [	<250	<250	<250	<250	<250	<250
fluorotrichlorometh		<500	<500	<500	<50 <b>0</b>	<500	<500
dichlorodifluoromet		<500	<500	<500	ረ5በე	<500	<500
chlorodibromomethan	ne	<250	<250	<250	<250	<250	<250
tetrachloroethene	ţ	<250	<250	<250	<250	<250	<250
trichloroethene		<250	<250	<250	<250	<250	<250
vinyl chloride	i	<500	<500	<500	<500	<500	<b>K500</b>

### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

# RESULTS OF SOIL ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/kg as received)

U-3772.10

	E & E Lab. No. 86-	5780	5781				
Compound	Sample Identity	9136	9137				
carbon tetrachloride		<250	<250				
1,2-dichloroethane		<100	<100		į	l	
1,1,1-trichloroethane		<250	<250		1		
1,1-dichloroethane		<100	<100		l	Į	Į
1,1,2-trichloroethane		<500	<500		i	Ì	
1,1,2,2-tetrachloroet	hane	<250	<250		ł	}	
chloroethane		<500	<500			}	
2-chloroethylvinyl et	her	<5000	<5000		Ì	1	Ì
chloroform		<250	<250				İ
1,1-dichloroethene		<100	<100				]
trans-1,2-dichloroeth	ene	<100	<100			Į	i
1,2-dichloropropane		<1000	<1000		į	Į	l
trans-1,3-dichloropro	pene	<1000	<1000	Į	į.	į	ļ
cis-1,3-dichloroprope	ne	<1000	<1000	[	1	1	Ì
methylene chloride		<50	<50				
chloromethane		<500	<500		l	Ì	1
bromomethane		<500	<500		1	ļ	}
bromoform		<1000	<1000	ļ	1	İ	l
bromodichloromethane		<250	<250				ŀ
fluorotrichloromethan	ie	<500	<500	[	Ì	!	
dichlorodifluorometha	ine	<500	<500	ĺ	<u> </u>	1	1
chlorodibromomethane		<250	<250		l	[	
tetrachloroethene		<250	<250	1	1	Į	[
trichløroethene		<250	<250	l	t	1	ł
vinyl chloride		<500	<500				

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#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

		(ug/kg)		Relative
Compound	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
carbon tetrachloride	5769	<250	<250	
1,2-dichloroethane	5769	<100	<100	
1,1,1-trichloroethane	5769	<250	<250	
1,1-dichloroethane	5769	<100	<100	
1,1,2-trichloroethane	5769	<500	<500	
1,1,2,2-tetrachloroethane	5769	<250	<250	
chloroethane	5769	<500	<500	
2-chloroethylvinyl ether	5769	<5000	<5000	
chloroform	5769	<25n	<250	
1,1-dichloroethene	5769	<100	<100	
trans-1,2-dichloroethene	5769	<100	<100	
1,2-dichloropropane	5769	<1000	<1000	
trans-1,3-dichloropropene	5769	<1000	<1000	
cis-1,3-dichloropropene	5769	<1000	<1000	
methylene chloride	5769	<50	<50	
chloromethane	5769	<500	<500	
bromomethane	5769	<500	<500	
bromoform	5769	<1000	<1000	
bromodichloromethane	5769	<250	<250	
fluorotrichloromethane	5769	<500	<500	
dichlorodifluoromethane	5769	<500	<500	
chlorodibromomethane	5769	<250	<250	
tetrachloroethene	5769	<250	<250	
trichloroethene	5769	<250	<250	
vinyl chloride	5769	<500	<500	



## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined		
Compound	Laboratory No. 86-		(ug/kg)		Percent Recovery	
carbon tetrachloride	5779 5779	<250 <100	1250 1250	777.8 992.9	62.2 79.4	
1,1,1-trichloroethane	5779	<250	1250	902.2	72.2	
1,1-dichloroethane chloroethane	5779 5779	<100 <500	1250 1250	922.2 1225	73.8 98.0	
chloroform trans-1,2-dichloroethene	5779 5779	<250 <100	1250 1250	912.4 777.8	73.0 62.2	
methylene chloride	5779	<50	1250	845.1	67.6	
chloromethane bromomethane	5779 5779	<500 <500	1250 1250	1165 1738	93.2 139	
bromoform	5779	<1000	1250	908.8	72.7	
bromodichloromethane trichloroethene	5779 5779	<250 <250	1250 1250	782.7 956.9	62.6 76.6	
	}	]	}	<u> </u>	}	
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### ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

## RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E & E Lab. No. 86-	5760	5761	5762	5763	5764
Compound	Sample Identity	9116	9117	9118	9119	9120
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene	1,2-dichlorobenzene		<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzen <b>e</b>		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene		<250	<250	<250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250
		<del></del>	·	<b></b> _	<del> </del>	<del></del>



## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

## RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E & E Lab. No. 86-	5765	5766	5767	5768	5769
Compound	Sample Identity	9121	9122	9123	9124	9125
chlorobenzene	:	<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<b>&lt;500</b>	<500
toluene		<250	<250	<250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250

## ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

## RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E & E Lab. No. 86-	5770	5771	5772	5773	5774
Compound	Sample Identity	9126	9127	9128	9129	9130
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene	1,2-dichlarobenzene		<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene		<250	<250	<250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250



## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

U-3772.16

	E & E Lab. No. 86-	5775	5776	5777	5778	5779
Compound	Sample Identity	9131	9132	9133	9134	9135
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene		<500	<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes		<500	<500	<500	<500	<500
toluene		<250	<250	<250	<250	<250
ethylbenzene		<250	<250	<250	<250	<250



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## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SER V I C E S C E N T E R

### RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E & E Lab. No. 86~	5780	5781	Blank	Blank	Blank
Compound	Sample Identity	9136	9137	7/30/86	7/30/86	7/31/86
chlorobenzene		<250	<250	<250	<250	<250
1,2-dichlorobenzene	1,2-dichlorobenzene		<500	<500	<500	<500
1,3-dichlorobenzene		<500	<500	<500	<500	<500
1,4-dichlorobenzene		<500	<500	<500	<500	<500
benzene		<250	<250	<250	<250	<250
total xylenes	total xylenes		<500	<500	<500	<500
toluene		<250	<250	<250	<250	<250
ethy Ibenzene		<250	<250	<250	<250	<250



## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L SERVICES CENTER

## RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/kg as received)

	E & E Lab. No. 86-	Blank			
Compound	Sample Identity	8/1/86			
chlorobenzene		<250			
1,2-dichlorobenzene		<b>(500</b>			
1,3-dichlorobenzene		<500	; 		
1,4-dichlorobenzene		<500			
benzene		<250		'	
total xylenes		<500			
toluene		<250			
ethylbenzene		<250		ı	



#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

U-3772.19

		(ug	/kg)	Relative	
Parameter	E & E Laboratory Original No. 86- Analysis		Replicate Analysis	Percent Difference (RPD)	
chlorobenzene	5772	<250	<250		
1,2-dichlorobenzene	5772	<500	<500		
1,3-dichlorobenzene	5772	<500	<500		
1,4-dichlorobenzene	5772	<500	<500		
benzene	5772	<250	<250		
total xylenes	5772	<500	<500		
toluene	5772	<250	<250		
ethyl benzene	5772	<250	<250		



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QUAL	ITY CONTROL FOR A	ACCURACY: PE ED SOIL SAMPL	ERCENT RECO	OVERY		
	. 5.1				U-3772.20	
	E&E	Original Value	Amount Added	Amount Determined		
Compound	Laboratory No. 86-		(ug/kg)		Percent Recovery	
1,2-dichlorobenzene	5781	<500	1250	1230	98	
1,3-dichlorobenzene	5781	<500	1250	1232	99	- 1
1,4-dichlorobenzene	5781	<500	1250	1234	99	•
toluene	5781	<250	1250	1254	100	
ethyl benzene	5781	<250	1250	1253	100	
					<b></b>	
				•		
						1
	Н	-368				
	н	-368				



# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

			,			
	E & E Lab. No. 86-	5760	5761	5762	5763	5764
Compound	Sample Identity	9116	9117	9118	91 19	9120
bis(2-chloroethyl)ether		<1	<b>&lt;</b> 1	<1	<1	<b>&lt;</b> 1
1.3-dichlorobenzene		<1	<1	<1	<1	<1
1,4-dichlorobenzene		<1	<1	<1	<1	<1
1.2-dichlorobenzene		<1	<1	<1	<1	<1
bis(2-chloroisopropyl)ether		<1	<1	<1	<1	<1
N-nitrosodipropylamine		<1	<1	<1	<1	<1
hexachloroethane		<1	<1	<1	<1	<1
nitrobenzene		<1	<1	<1	<1	<b>K</b> 1
isophorone		<1	<1	<1	<1	<1
bis(2-chloroethoxy)methane		₹1	₹1	ζί	<u> </u>	ζ1
1,2,4-trichlorobenzene		<b>&lt;</b> 1	ζ1	ζί	ζi	<1
naphthalene		<b> </b>	<1	ķί	ζί	ζi
hexachlorobutadiene		<1	<1	<1	<1	(1
hexachlorocyclopentadiene		(1	ζ1	<u> </u>	<u> </u>	<1
2-chloronaphthalene		<1	<b>&lt;</b> 1	\ \cdot\(\diam\)	<u> </u>	(1
dimethyl phthalate		(1	ξi	\ \cdot\(\frac{1}{2}\)	ξi	i i
acenaphthylene		<b>ć</b> 1	<1	31	i di	\ \cdot\{\dag{i}
fluorene		(1	ζί	<u> </u>	ξi	<u> </u>
acenaphthene		(1	ζί	\ \cdot\(\delta\)	\ \cdot\( \cdot\)	\ \cdot\( \cdot\)
2,4-dinitrotoluene		\ \cdot\(\frac{1}{1}\)	<u> </u>	3	<b>ķ</b> 1	(1
2,6-dinitrotoluene		\ \cdot\(\frac{1}{1}\)	ξί	<u> </u>	લેં	31
diethylphthalate		31	<u> </u>	\ \cdot\(\delta\)	31	\ \d
4-chlorophenyl phenyl ether		<u> </u>	₹1	\ \di	3	ζ1
N-nitrosodiphenylamine		3	ζ1	\ \di	\ \di	\ \di
4-bromophenyl phenyl ether		3	\ \cdot\(\frac{1}{1}\)	\ \di	\ \di	\ \di
hexachlorobenzene		l 21	}	👸	3	\ \tilde{\chi_1}
phenanthrene		3	\ \cdot\(\frac{1}{1}\)	3	<u> </u>	\ \tag{1}
anthracene		31	<u> </u>	<u> </u>	<u> </u>	\ \cdot\( 1
di-n-butyl phthelate		31	4.1	3	3	\ \(\cdot\)
fluoranthene		31	<del>71</del>	<u> </u>	<u> </u>	\ \cdot\(\frac{1}{1}\)
benzidine		3	ે ડે	₹5	\ \cdot\{\cdot\}	\int \int \int \int \int \int \int \int
pyrene		(1)	\ \di	$\stackrel{\sim}{\sim}$	<u> </u>	(1
butyl benzyl phthalate		\ \cdot\(\frac{1}{2}\)	\ <1	}	à	<b>\(\)</b> 1
3.3'-dichlorobenzidine		3	3	3	3	3
benzo(a)anthracene		(1	31	\ \di	• <1	(1
bis(2-ethylhexyl)phthalate		}	3	\ \di	3	(1
chrysene		31	3	3	\ \d	(1
di-n-octyl phthalate		21	l 2i	<u> </u>	<1+ <1+	1 3
benzo(b)fluoranthene		<u> </u>	\ \cdot\(\delta\)	31	<1	31
benzo(k)fluoranthene			\ \cdot\(\frac{1}{\cdot\(\frac{1}{\cdot\}}\)	<1	\ \ \( \)	
• •		1	<1			<1
benzo(a)pyrene		<1		<1 <1	<1	<1
indeno(1,2,3-cd)pyrene		<1	<1	<1	<1	<b>(1</b>
dibenzo(a,h)anthracene benzo(ghi)perylene		<1 <1	<1 <1	<1 <1	(1 (1	<1 <1

<sup>\*</sup>Compound present below measurable detection limit.



# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

	E & E Lab. No. 86-	5765	5766	5767	5768	5769
Compound	Sample Identity	9121	9122	9123	9124	9125
bis(2-chloroethyl)ether		<1	<b>&lt;</b> 1	<1	<1	<1
1,3-dichlorobenzene		<1	<1	<1	(1	<1
1,4-dichlorobenzene		<1	<1	<1	(1	ζί
1.2-dichlorobenzene		<1	<1	<1	<1	<1
bis(2-chloroisopropyl)ether		<1	<1	<1	<1	l ä
N-nitromodipropylamine		<1	<1	<1	<b>1</b> <1	<1
hexachlorosthane		<1	<1	<1	<1	(1
nitrobenzene		<1	<1	<1	<1	<1
isophorone		<1	<1	<1	<1	<1
bis(2-chloroethoxy)methane		<1	<1	<1	<1	<1
1,2,4-trichlorobenzene		<1	<b>1</b> <1	<1	<1	<1
naphthalene		<1	<1	<1	<1	<1
hexachlorobutadiene		<1	<1	<1	l <1	<1
hexachlorocyclopentadiene		<b> </b> <1	<1	<1	<1	<1
2-chloronaphthalene		<1	<1	<1	<1	<1
dimethyl phthalate		<1	<1	<1	<1	<1
acenaphthylene		<1	<1	<1	<1	<1
fluorene		<1	<1	<1	<1	(i
acenaphthene		<1	<1	<1	<1	<1
2,4-dinitrotoluene		<1	<1	<1	<1	<1
2,6-dinitrotaluene		<1	<1	<1	(1	<1
diethylphthalate		<1	<1	<1	<b> </b> <1	<1
4-chlorophenyl phenyl ether	•	<1	<1	<1	<1	<1
N-nitrosodiphenylamine		<1	<1	<1	<1	<1
4-bromophenyl phenyl ether		<1	<1	<1	<1	<1
hexachlorobenzene		<1	<1	<1	<1	<1
phenanthrene		<1	<1	<1	<1	<1
anthracene		<1	<1	<1	<1	<1
di-n-butyl phthalate		<1	<1	<1	<1	<1
fluoranthene		<1	<1	<1	<1	<1
benzidine		(5	<5	<5	<5	<5
pyrene		<1	<1	<1	<1	<1
butyl benzyl phthalate		<1	<1	<1	<1	<1
3,3'-dichlorobenzidine		(3	<3	<3	<3	(3
benzo(a)anthracene		<1	<1	<1	<1	<1
bis(2-ethylhexyl)phthalate		<1	<1	<1	<1	<1
chrysene		<1	<1	<1	<1	<1
di-n-octyl phthalate		<1	<1	<1*	<u>1.8</u>	<1
benzo(b)fluoranthene		<1	<1	<1	<u>&lt;1</u>	<1
benzo(k)fluoranthene		<1	<1	<1	<1	<1
benzo(a)pyrene		<1	<1	<1	<1	<1
indeno(1,2,3-cd)pyrene		<1	<1	<1	<1	<1
dibenzo(a,h)anthracene		<b>(1</b>	<1	<1	<1	<1
benzo(ghi)perylene		<1	<1	<1	<1	<1
<u> </u>						

<sup>\*</sup>Compound present below measurable detection limit.



# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

E & E Lab. No. 86-	5770	5771	5772	5773	5774
	<u> </u>				-
Sample Identity	9126	<del>9</del> 127	9128	9129	9130
	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<b>&lt;</b> 1
	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<u> </u>
					ξ1
		. ,		` '	<u> </u>
;		<b>&lt;</b> 1	\ \cdot\(\frac{1}{1}\)		<u> </u>
		<b>&lt;</b> 1	<1		ζί
					<1
					ζί
	**	, , ,	• • •	,,,	<1
	<1	<u> </u>	<u> </u>	• • •	<1
		, ,,			<1
					ζ1
					\ \cdot\(\delta\)
		, ,		, ,	<u> </u>
					<b>\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ </b>
	* * *				<u> </u>
•	4		1		<u> </u>
				* * * * * * * * * * * * * * * * * * * *	31
		- '	1 ''	,,	<u> </u>
				'''	<1
		,,,	, ,	1 ''	<1
				''	ζ1
		, ,			ζ1
		, , ,		., ,	ξί
	<5	<b>(</b> 5			<5
	(i	ζί	(1	ζί	ζί
	<1	<b>&lt;</b> 1	ζ1		<1
	3	₹3	(3	3	3
	<b>(1</b>	ζ1		· · ·	<1
	l či	ζ1		\ \cdot\{\frac{1}{1}}	<u> </u>
					<1
					₹1+
	<del>                                    </del>	<u> </u>	<del>(1</del>	<del>;;</del>	<b>(i</b>
	<1	ζ1	<1		<u> </u>
	l	ζί	<u> </u>	\ \cdot\( 1	<u> </u>
	ζ1	ζί	₹1	\ \cdot\(\frac{1}{1}\)	\ \cdot\(\frac{1}{3}\)
	l	ζί	<u> </u>	'''	<b>ķ</b> i
	l di	ζ1	₹1	\ \cdot\(\)1	<b>~</b> 1
	No. 86-	No. 86- 5770  Sample Identity 9126  C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C	No. 86-   5770   5771	No. 86-   5770   5771   5772     5772	No. 86-   5770   5771   5772   5773

<sup>\*</sup>Compound present below measurable detection limit.

# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

	E & E Lab. No. 86-	5775	5776	5777	5778	5779
Compound	Sample Identity	9131	9132	9133	9134	9135
bis(2-chloroethyl)ether		<b>&lt;</b> 1	<b>&lt;</b> 1	<b>&lt;</b> 1	<b>&lt;</b> 1	<1
1,3-dichlorobenzene		ξi	ξί	<b>\cdot</b>	<u> </u>	31
1,4-dichlorobenzene		ζ1	ζ1	<b>ķ</b> i	<u> </u>	\ <del>``</del> \
1,2-dichlorobenzene		<b>(1</b>	ζ1	\ \cdot\(\frac{1}{2}\)	\	<u> </u>
bis(2-chloroisopropyl)ether	i	<1	<1	ζ1	ξί	ξi
N-nitrosodipropylamine		ζ1	ζ1	λì	λί	ξί
hexachlorgethane	i	ξi	<u> </u>	<u> </u>	<u> </u>	<b>₹</b> 1
nitrobenzene		ζi	ζί	<u> </u>	ζ1	3
isophorone		ζ1	<b>\)</b>	<b>&lt;</b> 1	<b>&lt;</b> 1	\ \d
bis(2-chloroethoxy)methane		ζί	ζ1	<b>&lt;</b> 1	ζ1	\ \cdot\( 1
1.2.4-trichlorobenzene	i	\ \cdot\(\frac{1}{3}\)	ζ1	ζ1	ζ1	ζί
naphthalene	!	ξί	ζ1	ξί	<u> </u>	ξί
hexachlorobutadiene	i	<u> </u>	ζ1	ζί	ζi	ξί
hexachlorocyclopentadiene		ξί	ξί	<u> </u>	λ1	<u> </u>
2-chloronaphthalene		ξί	<u> </u>	<u> </u>	\ \di	l
dimethyl phthalate		ζ1	ξi	ξί	<u> </u>	\ <del>\</del> \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
acenaphthylene		ζί	ξί :	<u> </u>	\ \cdot\(\frac{1}{3}\)	\ \cdot\(\frac{1}{3}\)
fluorene		l ä	<b>&lt;</b> 1	<1	ζ1	<1
acenaphthene		<1	ζ1	<u> </u>	\ \cdot\(\frac{1}{3}\)	\
2.4-dinitrotoluene		<u> </u>	ζ1	<1	ζ1	<1
2,6-dinitrotoluene		<u> </u>	ζ1	ζ1	ζί -	₹1
diethylphthalate		<1	ζ1	ξί	ζ1	<u> </u>
4-chlorophenyl phenyl ether	!	<1	(i ·	ζ1	ζ1	ξi
N-nitrosodiphenylamine	!	<u> </u>	<u> </u>	ζ1	<1	<u> </u>
4-bromophenyl phenyl ether	!	ζ1	ζ1	<b>&lt;</b> 1	ζ1	\ \cdot\(\frac{1}{1}\)
hexachlorobenzene		<u> </u>	ζ1	<u> </u>	<b>&lt;</b> 1	\ \cdot\(\frac{1}{3}\)
phenanthrene		<1	<b>&lt;</b> 1	<b>&lt;</b> 1	<b>&lt;</b> 1	<u> </u>
anthracene		<1	<1	ζ1	ζί	ζi
di-n-butyl phthalate		<1	<b>&lt;</b> 1	<1	<1	ζ1
fluoranthene		<1	<1	<1	<1	ζί
benzidin <b>e</b>		<5	<5	<5	<5	<5
pyren <del>e</del>		<1	<1	<1	<1	<1
butyl benzyl phthalate		<1	<1	<1	<1	<1
3,3'-dichlorobenzidine		<3	<3	<3	<3	ä
benzo(a)anthracene		<1	<1	<1	<1	<1
bis(2-ethylhexyl)phthelate		<1	<1	<1	<1	<1
chrysene		<1	<1	<1	<1	<1
di-n-octyl phthalate		<1	<1	<1	<1	<1
benzo(b)fluoranthene		<1	<1	<1	<1	<1
benzo(k)fluoranthene		<1	<1	<1	<1	<b>&lt;</b> 1
benzo(a)pyrene		<1	<1	<1	<1	ζί
indeno(1,2,3-cd)pyrene		<1	<1	<1	<1	ζ1
dibenzo(a,h)anthracene		<1	<b>&lt;</b> 1	ζ1	ζ1	Κi
benzo(ghi)perylene		<1	<1	<1	<1	<1
<u> </u>						

<sup>\*</sup>Compound present below measurable detection limit.



# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

	E & E Lab. No. 86-	5780	5781	Method Blank		
Compound	Sample Identity	9136	9137	ug/L		
bis(2-chloroethyl)ether		<1	<b>&lt;</b> 1	<b>&lt;10</b>		
1,3-dichlorobenzene		(1	<1	<10		
1.4-dichlorobenzene		<b>(1</b>	<b>&lt;</b> 1	<10		
1,2-dichlorobenzene		<1	<1	<10	Ì	(
bis(2-chloroisopropyl)ether		<1	<1	<10		
N-nitrosodipropylamine		<1	<1	<10		
hexachloroethane		<1	<1	<10		
nitrobenzene		<1	<1	<10		
isophorone		<1	<1	<10	1	
bis(2-chloroethoxy)methane		<1	<1	<10	ļ	
1,2,4-trichlorobenzene		<1	<1	<10		
naphthalene		<1	<1	<10		
hexachlorobutadiene		(1	ζ1	<10	}	
hexachlorocyclopentadiene		<1	<1	<10		
2-chloronaphthalene		<b>1</b> <1	<1	<10		
dimethyl phthalate	i	<1	<1	<10		
acenaphthylene		<1	<1	<10	}	
fluorene		<1	<1	<10		
acenaphthene		<1	<1	<10		
2,4-dinitrotoluene		<1	<1	<10		
2,6-dinitrotoluene	+	<1	<1	<10		
diethylphthalate		<1	<1	<10		
4-chlorophenyl phenyl ether		<1	<b>&lt;1</b>	<10		
N-nitrosodiphenylamine		<1	<1	<10	!	
4-bromophenyl phenyl ether		<1	<1	<10		
hexachlorobenzene		<b>1</b> <1	<1	<10		
phenanthrene		<1	<1	<10		
anthracene	1	<1	<1	<10		
di-n-butyl phthalate		<1	<1	<10		
fluoranthene	1	<1	<1	<10	l	
benzidine		<5	<5	<50		
pyrene	i	<1	<1	<10		
butyl benzyl phthalate	1	<1	<1	<10	1	
3,3'-dichlorobenzidine		<3	ধ্য	<30		
benzo(a)anthracene		<1	<1	<10	Ī	
bis(2-ethylhexyl)phthalate		<1	<1	<10		
chrysene		<1	<1	<10		
di-n-octyl phthalate		<1	<b>&lt;</b> 1	<10		
benzo(b)fluoranthene	i	<1	<1	<10		
benzo(k)fluoranthene		<1	<1	<10		
benzo(a)pyrene		<1	<1	<10		
indeno(1,2,3-cd)pyrene		<1	<1	<10		
dibenzo(a,h)anthracene		<1	<1	<10		
benzo(ghi)perylene		<1	<b>&lt;</b> 1	<10		
<b></b>		ļ				<b></b>

<sup>\*</sup>Compound present below measurable detection limit.

		ECOLOGY AND L Y T I C A L JLTS OF SOIL ANAI ACID EXTRACTAI (all results :	SERVI( LYSIS FOR PI BLE COMPOUND	CES CE RIORITY POLI DS BY GC/MS			
		LYTICAL JLTS OF SOIL ANAI ACID EXTRACTAI	SERVI( LYSIS FOR PI BLE COMPOUND	CES CE RIORITY POLI DS BY GC/MS			
		LYTICAL JLTS OF SOIL ANAI ACID EXTRACTAI	SERVI( LYSIS FOR PI BLE COMPOUND	CES CE RIORITY POLI DS BY GC/MS			
		LYTICAL JLTS OF SOIL ANAI ACID EXTRACTAI	SERVI( LYSIS FOR PI BLE COMPOUND	CES CE RIORITY POLI DS BY GC/MS			
		LYTICAL JLTS OF SOIL ANAI ACID EXTRACTAI	SERVI( LYSIS FOR PI BLE COMPOUND	CES CE RIORITY POLI DS BY GC/MS			
		LYTICAL JLTS OF SOIL ANAI ACID EXTRACTAI	SERVI( LYSIS FOR PI BLE COMPOUND	CES CE RIORITY POLI DS BY GC/MS			
		LYTICAL JLTS OF SOIL ANAI ACID EXTRACTAI	SERVI( LYSIS FOR PI BLE COMPOUND	CES CE RIORITY POLI DS BY GC/MS			
		LYTICAL JLTS OF SOIL ANAI ACID EXTRACTAI	SERVI( LYSIS FOR PI BLE COMPOUND	CES CE RIORITY POLI DS BY GC/MS			
		JLTS OF SOIL ANAI ACID EXTRACTAI	LYSIS FOR PI BLE COMPOUND	RIORITY POLI OS BY GC/MS			
	ne x	ACID EXTRACTAL	BLE COMPOUND	DS BY GC/MS	-OTANI		
		(all results :	in mg/kg, a				
				s received)			
							U-3772
	1	T T	<u> </u>			<del> </del>	1
		E & E Lab. No. 86-	5760	5761	5762	5763	5764
		Sample					
	Compound	Identity	9116	9117	91 18	9119	9120
	phenol		<1	<b>&lt;</b> 1	<1	<1	<1
	2-chlorophenol		<1	<1	<1	<1	<1
	2-nitrophenol 2,4-dimethylphenol		<1 <1	<1 <1	<1 <1	<1 <1	<1 <1
	2,4-dichlorophenol	ł	<1	<1	<1	<1 <1	<1
	4-chlaro-3-methylphenol		<1	<1	<1	<b>&lt;1</b>	<1
	2,4,6-trichlorophenol 2,4-dinitrophenol	Ì	<1 <3	<1 <3	<1 <3	<1 <3	(1)
	4-nitrophenol	Ì	<1	<1	<1	<1	<1
	4,6-dinitro-2-methylphenol		(3	(3	(3	(3	(3
	pentachlorophenol		(3	<3	<3	<3	(3
	#Connect below	able detaction 1					<b>!</b>
	*Compound present below measur	ante defection l	±M1€•				
•							
			H-374				
			11-3/4				



# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

	E & E Lab. No. 86-	5765	5766	5767	5768	5769
Compound	Sample Identity	9121	9122	9123	9124	9125
phenol		<b>&lt;</b> 1	<1	<1	<b>&lt;</b> 1	<1
2-chlarophenol	1	<1	<1	<1	<1	<1
2-nitrophenol	İ	<1	<1	<1	<1	<1
2,4-dimethylphenol	Ī	<1	<1	<1	<1	<1
2,4-dichlorophenol	į	<1	<1	<1	<1	<1
4-chloro-3-methylphenol	j	<1	<1	<1	<1	<1
2,4,6-trichlorophenol	Í	<1	<1	<1	<1	- <1
2,4-dinitrophenol	i	<3	<3	ধ্য	<3	<3
4-nitrophenol	ŀ	<1	<1	<1	<1	<1
4,6-dinitro-2-methylphenol	Í	<3	<3	<3	<3	<b>(3</b>
pentachlorophenol	f	<3	<3	<3	<3	(3

<sup>\*</sup>Compound present below measurable detection limit.



# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

	E & E Lab. No. 86-	5770	5771	5772	5773	5774
Compound	Sample Identity	9126	9127	9128	9129	9130
phenol		<1	<1	<1	<1	<1
2-chlorophenol	Į	<1	<1	<1	<1	<1
2-nitrophenol		<1	<1	<1	<1	<1
2,4-dimethylphenol		<1	<1	<1	<1	<1
2,4-dichlorophenol		<1	<1	<1	<1	<b>(</b> 1
4-chloro-3-methylphenol		<1	<1	<1	<1	<1
2,4,6-trichlorophenal		<1	<1	<1	<1	<1
2,4-dinitrophenol	•	<3	<3	<3	<3	(3
4-nitrophenol		<1	<1	<1	<1	<1
4,6-dinitro-2-methylpheno	1	<3	<3	<3	<3	(3
pentachlorophenol		(3	<3	<3	<3	(3

<sup>\*</sup>Compound present below measurable detection limit.



# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

	E&ELab. No.86-	5775	5776	5777	5778	5779
Compound	Sample Identity	9131	9132	9133	9134	9135
phenol	• -	<1	<1	<1	<b>&lt;</b> 1	<1
2-chlorophenol		<1	<1	<1	<1	<1
2-nitrophenol		<1	<1	<1	<1	<1
2,4-dimethylphenol		<1	<1	<1	<1	<1
2,4-dichlorophenol		<1	<1	<1	<b>&lt;</b> 1	<1
4-chloro-3-methylphenol		<1	<1	<1	<1	<1
2,4,6-trichlorophenol		<1	<1	<1	<1	<1
2,4-dinitrophenol	'	<3	<3	<3	<3	<3
4-nitrophenol		<1	<1	<1	<1	<1
4,6-dinitro-2-methylphenol		<3	<b>(3</b>	<3	<3	(3
pentachlorophenol		<3	<3	(3	<3	<3

<sup>\*</sup>Compound present below measurable detection limit.

# RESULTS OF SOIL ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in mg/kg, as received)

	E & É Lab. No. 86-	5780	5781	Method 81suk		
Compound	Sample Identity	9136	9137	ug/L		
phenol		<1	<b>&lt;1</b>	<10		
2-chlorophenol		<1	<1	<10		
2-nitrophenol		<1	<1	<10		
2,4-dimethylphenol	j	<1	<1	<10		
2,4-dichlorophenol	ì	<1	<1	<10		
4-chloro-3-methylphenol	)	<1	<1	<10	}	
2,4,6-trichlorophenol		<1	<1	<10		
2,4-dinitrophenol		<b>3</b>	<3	<30		
4-nitrophenol		<1	<1	<10		
4,6-dinitro-2-methylphenol	ĺ	<3	<3	<30	Į	
pentachlorophenol	ì	<b>(3</b>	<3	30	}	)

<sup>\*</sup>Compound present below measurable detection limit.

U-3772.31

	E & E	Amount Added	Amount Determined	
Compound	No. 86-	(	Percent Recovery	
nitrobenzene-D5	5760	3.3	1.6	48.5
	5761	3.3	2.4	72.7
	5762	3.3	2.2	66.7
1	5763	3.3	1.8	54.5
1	5764	3.3	1.8	54.5
	5765	3.3	2.7	81.8
	5766	3.3	2.2	66.7
	5767	3.3	2.1	63.6
	5768	3.3	2.7	81.8
	5769	3.3	2.1	63.6
	5770	3.3	2.5	75.6
	5771	3.3	2.1	63.6
	5772	3.3	2.5	75.6
	5773	3.3	2.2	66.7
	5774	3.3	2.8	84.8
	5775	3.3	1.5	45.5
	5776	3.3	1.9	57.6
	5777	3.3	1.9	57.6
	5778	3.3	1.8	54.5
	57 <b>79</b>	3.3	1.8	54.5
	5780	3.3	1.9	57.6
	5781	3.3	2.4	72.7
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These recoveries are acceptable to  $\ensuremath{\mathsf{EPA}}$  Contract Lab Program (CLP) guidelines.

U-3772.32

	E&E	Amount Added	Amount Determined		
Compound	No. 86-		Percent Recovery		
2-fluorobiphenyl	5760	3.3	2.9	87.9	
2-1100E001pheny1	5761	3.3	3.8	1	
	5762	3.3	3.5	115 106	
	5763	3.3	3.0	90.9	
	5764		h .		
	5765	3.3 3.3	2.8 3.7	84.8	
	5766	3.3	3.5	106	
	5767	3.3	3.3	100	
	5768	3.3	3.7	112	
	5769	3.3	3.5	106	
	5770	3.3	3.7	112	
	5771	3.3	3.2	97.0	
	5772	3.3	3.1	93.9	
	5773	3.3	3.1	93.9	
	5774	3.3	3.7	112	
	5775	3.3	2.2	66.7	
	5776	3.3	2.2	66.7	
	5777	3.3	2.4	72.7	
	5778	3.3	2.5	75.8	
	5779	3.3	2.4	72.7	
	5780	3.3	2.2	66.7	
	5781	3.3	3.2	97.0	
	1	]	]	] '''	
				]	
			1		

These recoveries are acceptable to EPA Contract Lab Program (CLP)  $\ensuremath{\mathsf{guide-lines}}$  .



U-3772.33

	E&E	Amount Added	Amount Determined	
Compound	Laboratory No. 86-	(	Percent Recovery	
			_	
terphenyl-D14	5760	3.3	1.3	39.4
	5741	3.3	1.5	45.5
	5762 5763	3.3 3.3	1.5	45.5
	5764	3.3	1.2	36.4 45.5
	5765	3.3	2.3	69.7
	5766	3.3	1.5	45.5
	5767	3.3	1.8	54.5
	5768	3.3	2.6	78.8
	5769	3.3	1.4	42.4
	5770	3.3	1.7	51.5
	5771	3.3	2.9	87.9
	5772	3.3	2.2	66.7
	5773	3.3	2.2	66.7
	5774	3.3	2.9	87.9
	5775	3.3	1.5	45.5
	5776	3.3	1.5	45.5
	5777	3.3	1.6	48.5
	5778	3.3	1.6	48.5
	5779	3.3	1.6	48.5
	5780	3.3	1.4	42.4
	5781	3.3	2.4	72.7
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U-3772.34

	E&E	Amount Added	Amount Determined	
Compound	Laboratory No. 86-	(	Percent Recovery	
phenol-D5	5760	6.6	2.2	33.3
	5761	6.6	3.1	47.0
	5762	6.6	3.2	48.5
	5763	6.6	2.5	37.9
	5764	6.6	2.4	36.4
	5765	6.6	3.3	50.0
	5766	6.6	3.2	48.5
	5767	6.6	3.2	48.5
	5768	6.6	3.4	51.5
	5769	6.6	2.7	40.9
	5770	6.6	3.3	50.0
	5771	6.6	2.3	34.8
	5772	6.6	3.0	45.5
	5773	6.6	2.6	39.4
	5774	6.6	3.8	57.6
	5775	6.6	2.0	30.3
	5776	6.6	1.9	28.8
	5777	6.6	2.5	37.9
	5778	6.6	2.0	30.3
	5779	6.6	2.4	36.4
	5780	6.6	2.1	31.8
	5781	6.6	2.8	42.4
	,,,,,			
			ļ	

U-3772.35

	E&E	Amount Added	Amount Determined	
Compound	Laboratory No. 86-	(mg/kg)		Percent Recovery
2-fluarophenal	5760 5761 5762 5763 5764 5765 5766 5767 5768 5769 5770 5771 5772 5773 5774 5775 5776 5777	6.6 6.6 6.6 6.6 6.6 6.6 6.6 6.6 6.6 6.6	1.6 1.8 2.8 1.8 1.8 2.4 3.0 2.2 2.4 2.0 2.5 1.9 2.1 1.7 2.8 1.5 1.9 2.7 2.0 2.7	24.2 27.3 42.4 27.3 27.3 36.4 45.5 33.3 36.4 30.3 37.9 28.8 31.8 25.8 42.4 22.7 28.8 40.9 30.3 31.8
	5780 5781	6.6 6.6	1.8 2.2	27.3 33.3

U-3772.36

	E&E	Amount Added	Amount Determined	
Compound	Laboratory No. 86-	(	(mg/kg)	
2,4,6-tribromophenol	5760 5761 5762 5763 5764 5765 5766 5767 5768 5769 5770 5771 5772 5773 5774 5775 5776 5777 5778 5778 5779	6.6 6.6 6.6 6.6 6.6 6.6 6.6 6.6 6.6 6.6	1.5 2.6 2.4 2.1 2.4 2.5 1.9 2.9 2.8 1.5 2.0 3.2 3.6 1.9 3.3 1.4 1.8 2.2 2.0 1.8	22.7 39.4 36.4 31.8 36.4 37.9 28.8 43.9 42.4 22.7 30.3 48.5 54.5 28.8 50.0 21.2 27.2 33.3 30.3 27.2 21.2
	5781	6.6	4.2	63.6

These recoveries are acceptable to  $\ensuremath{\mathsf{EPA}}$  Contract Lab Program (CLP) guidelines.

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

U-3772.37

		mg/kg		Relative
Compound	E & E Lab. No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
bis(2-chloroethyl)ether		<1	<1	
1,3-dichlorobenzene		<1	<1	
1,4-dichlorobenzene		<b>&lt;</b> 1	<1	
1,2-dichlorobenzene		<b>&lt;</b> 1	<1	
bis(2-chloroisopropyl)ether		<b>&lt;</b> 1	<1	
N-nitrosodipropylamine		<b>&lt;</b> 1	<1	
hexachloroethane		<1	<1	
nitrobenzene		<1	<1	
isophorone		<b>&lt;</b> 1	<1	
bis(2-chloroethoxy)methane		<1	<1	
1,2,4-trichlorobenzene		<1	<b>&lt;</b> 1	
naphthalene		<1	<b>&lt;</b> 1	
hexachlorobutadiene		<1	<b>&lt;</b> 1	
hexachlorocyclopentadiene		<1	<b>&lt;</b> 1	
2-chloronaphthalene		<1	<1	
dimethyl phthalate		<1	<b>&lt;</b> 1	
acenaphthylene		<1	<1	
fluorene		<1	<b>&lt;</b> 1	
acenaphthene		<1	<b>&lt;</b> 1	
2,4-dinitrotoluene		<1	<b>&lt;</b> 1	
2,6-dinitrotoluene		<1	<b>&lt;</b> 1	
diethylphthalate		<1	<b>&lt;</b> 1	
4-chlorophenyl phenyl ether		<1	<b>&lt;</b> 1	
N-nitrosodiphenylamine		<1	<1	
4-bromophenyl phenyl ether		<1	<1	
hexachlorobenzene		<1	<1	
phenanthrene		<1	<1	
anthracene		<1	<1	
di-n-butyl phthalate		<1	<1	
fluoranthene		<1	<1	
benzidine		<5	<5	
pyrene		<1	<1	
butyl benzyl phthalate		<1	<1	
3,3'-dichlorobenzidine		<3	<3	
benzo(a)anthracene		<b>&lt;</b> 1	<b>&lt;</b> 1	
bis(2-ethylhexyl)phthalate		<b>&lt;</b> 1	<b>&lt;1</b>	
chrysene		<1	<b>&lt;</b> 1	. <del></del>
di-n-octyl phthalate		<b>&lt;1</b>	<b>&lt;1</b>	
benzo(b)fluoranthene		<1	<b>&lt;</b> 1	
benzo(k)fluoranthene		<1	<b>&lt;</b> 1	
benza(a)pyrene		<1	<b>&lt;1</b>	
indeno(1,2,3-c,d)pyrene		<b>&lt;</b> 1	<1	
dibenzo(a,h)anthracene		<1	<1	
benzo(g,h,i)perylene		<1	<1	



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#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF SOIL SAMPLES

	, •	mg	Relative	
Compound	E & E Lab. No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
phenol		<b>&lt;</b> 1	<b>&lt;</b> 1	
2-chlarophenol	!	<1	<b>&lt;</b> 1	
2-nitrophenol		<1	<b>&lt;</b> 1	
2,4-dimethylphenol		<1	<1	
2,4-dichlorophenol		<1	<1	
4-chloro-3-methylphenol		<1	<1	
2,4,6-trichlorophenal		<1	<b>&lt;</b> 1	
2,4-dinitrophenol		(3	(3	
4-nitrophenol		<1	<1	
4,6-dinitro-2-methylphenol		<3	ß	
pentachlorophenol		<3	<3	



# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY--EPA QUALITY ASSURANCE MATERIALS SOLUTION ADDED TO SAMPLE #5776 PRIOR TO EXTRACTION

U-3772.39

Compound	True Value (ng)	Amount Determined (ng)	Percent Recovery
1,4-dichlorobenzene	251	126	50
bis(2-chloroisopropyl) ether	204	145	71
hexachloroethane	303	170	56
nitrobenzene	373	206	55
naphthalene	250	128	51
dimethyl phthalate	404	226	56
acenaphthene	197	107	54
fluorene	250	121	48
4-chlorophenyl phenyl ether	374	181	48
4-bromophenyl phenyl ether	373	231	62
anthracene	200	102	51
fluoranthene	301	159	53
butylbenzylphthalate	250	134	54
chrysene	209	93	44
bis(2-ethylhexyl)phthalate	153	80	52
benzo(b)fluoranthene	203	98	48
benzo(a)pyrene	224	110	49
dibenzo(a,h)anthracene	204	115	56
benzo(g,h,i)perylene	300	137	46

All these recoveries are acceptable to EPA guidelines.



# QUALITY CONTROL FOR ACC:#RACY: PERCENT RECOVERY--EPA QUALITY ASSURANCE MATERIALS SOLUTION ADDED TO SAMPLE #5776 PRIOR TO EXTRACTION

U-3772.40

Compound	True Value (ng)	Amount Determined (ng)	Percent Recovery
2-chlorophenol	300	150	50
2-nitrophenol	250	153	61
phenol	250	105	42
2,4-dimethylphenol	150	87	58
2,4-dichlorophenol	250	145	58
2,4,6-trichlorophenol	250	146	58
4-chloro-3-methylphenol	225	125	56
2-methyl-4,6-dinitrophenol	750	65	8.7
pentachlorophenol	375	159	42
4-nitrophenol	250	4.6	1.8
			L

With the exception of 4-nitrophenol and 2-methyl-4,6-dinitrophenol, these recoveries are acceptable to EPA guidelines.

# QUALITY CONTROL FOR ACCURACY: PERCENT DIFFERENCE--EPA QUALITY ASSURANCE MATERIALS

	Concentra	Concentrations in ug/L			
Parameter	Known	Determined	Percent Difference		
Arsenic	46.0 46.0	44.8 49.0	2.6 6.5		
Cadmium	940	913	2.9		
Chromium	1030	455	7.3		
Copper	1030	937	9.0		
Lead	53.0	52.5	0.9		
Nickel	1020	943	7.5		
Zinc	1010	964	4.6		
			<u> </u>		



	QUALITY CONTROL F RESULTS OF ANALYSI ANALYSES OF SC	FOR PRECISION IS OF REPLICA DIL SAMPLES	I NTE	
				U-3772.42
	E & E Laboratory	Original	y/kg) Replicate	Relative Percent Difference
Parameter	No . 86-	Analysie	Analysis	(RPD)
Solids	5763 5773	96 96	96 96	0
Arsenic	5775	<5.2	<5.2	
Cadmium	5775	<0.5	<0.5	
Chromium	5775	12.4	10.6	15.7
Copper	5775	8.25	8.06	2.3
Lead	5775	12.0	19.3	46.6
Nickel	5775	<10	<10	
Zinc	5775	47.5	43.1	9.7
		<u></u>	<b>I</b>	<b></b>
	H-390			



# QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED SOIL SAMPLES

	E&E	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86-		(mg/kg)		
Oil and Grease	5769	740	1550	2720	128
	5779	140	1560	2220	133
	5781	<100	1550	2040	132
Arsenic*	5765	<0.005	0.025	0.029	116
	5774	<0.005	0.025	0.028	112
Cadmium*	5765	<0.005	1.0	0.889	88.9
	5774	<0.005	1.0	0.901	90.1
Chromium*	5765	0.101	1.0	1.04	93.9
	5774	0.116	1.0	1.05	93.4
Copper*	5765	0.074	1.0	1.01	93.6
	5774	0.080	1.0	1.02	94.0
Lead*	5765	0.010	0.025	0.032	88.0
	5774	0.021	0.025	0.044	92.0
Nickel*	5765	<0.1	1.0	0.983	98.3
	5774	<0.1	1.0	0.982	98.2
Zinc*	5765	0.299	1.0	1.18	88.1
	5774	0.328	1.0	1.23	90.2
			[	1	Ì

<sup>\*</sup>Results in  $\operatorname{mg/L}$  because spiking is performed during digestion procedure.



# SAMPLE IDENTIFICATION CROSS-REFERENCE

U-3986.6

		<del></del>
Laboratory Number 86-	Field Number	Field Location
7348	9010	0165-PG-001-GP-86-9010
7349	9031	0165-PG-002-GP-86-9031
7350	9073	0165-PG-004-GP-86-9073



# SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

•				
U-3986.7		Pet. HC(28)	Anal	111
Þ		Pet.	Dead	111
		0&G(28)	Anal	9/12
		980	Dead	9/17
		105 (7)	Anal	8/25 8/25 8/25
		<u></u>	Dead	8/27 8/27 8/27
		Analysis	Anal	8/29 8/29 8/29
	+ 40)	Anal	Dead	10/1
	BNA(7/E + 40)	Extraction	Extr	8/22 8/22 8/22
		Extra	Dead	8/27
	اء	Analysis	Anal	111
	PAH (7/S + 30)	Anel	Dead	
	PAH (7/	Extraction	Extr	111
			Dead	111
		S. Canada	Date	8/20 8/20 8/20
		e l'omo y	Number	7348 7350 7350
		4	3	3986

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time.
Holding time expiration based on sample date.
Holding time expiration based on extraction date. DEAD: EXTR: ANAL: ( ): S+#: E+#:

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#### ECOLOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

## RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

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		ECOLOG	Y AND ENVIRO	NMENT'S. IN	c.	
	A	NALYTIC				R
		RESULTS OF WATE	ER ANALYSIS LE AROMATIC	FOR PRIORIS	TY POLLUTANT	Ī
			sults in ug/			
		,	<b>-</b>	-,	,	
	<del></del>		· <del> </del>		1	<del> </del>
		E & E Lab. No. 86-	Blank	7348*	7349*	7350 <del>*</del>
	Compound	Sample Identity	8/21/86	9010	9031	9073
	chlorobenzene		<0.20	<0.20	<0.20	<0.20
	1,2-dichlorobenzene		<0.40	<0.40	<0.40	<0.40
	1,3-dichlorobenzene		<0.40	<0.40	<0.40	<0.40
	1,4-dichlorobenzene		<0.30	<0.30	<0.30	<0.30
	benzene		<0.20	<0.20	<0.20	<0.20
	total xylenes		<1.0	<1.	<1.0	<1.0
	toluene		<0.20	3.9	6.8	3.2
	ethy I benzene	<del></del>	<0.20	<0.20	<0.20	<0.20
	*Samples confirmed - r	esults positiv	e.			
			H-394			
			п-394			

<sup>\*</sup>Samples confirmed - results positive.

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# RESULTS OF WATER ANALYSIS FOR ORGANOPHOSPHOROUS PESTICIDES BY GC

(all results in ug/L)

U-3986.1

	E & E Lab. No. 86-	Blank	7348	7349	7350			
Compound	Sample Identity	8/22/86	9010	9031	9073			
Naled		<0.10	<0.10	<0.10	<0.10			
Phorate		<0.15	<0.15	<0.15	<0.15			
Disulfoton		<0.20	<0.20	<0.20	<0.20	Į.		
Chlorpyrifos		<0.30	<0.30	<0.30	<0.30	ļ	}	
Dimethoate		<0.30	<0.30	<0.30	<0.30			
Malathion		<0.30	<0.30	<0.30	<0.30		]	 
Mevinphos		<0.30	<0.30	<0.30	<0.30			
Parathion		<0.30	<0.30	<0.30	<0.30			[
Methyl parathion		<0.30	<0.30	<0.30	<0.30			
Diazinon		<0.60	<0.60	<0.60	<0.60			
Methyl azinphos	i	<1.5	<1.5	<1.5	<b>&lt;1.</b> 5			

# RESULTS OF WATER ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/L)

U-3986.2

	E & E Lab. No. 86-	Blank	Blank	7348*	7349	7350*	
Compound	Sample Identity	8/21/86	8/22/86	9010	9031	9073	
carbon tetrachloride		<0.12	<0.12	<0.12	<0.12	<1.2	
1,2-dichloroethane		<0.03	<0.03	<0.03	<0.03	<0.30	
1,1,1-trichloroethane		<0.03	<0.03	<0.03	<0.03	<0.30	
1,1-dichloroethane		<0.07	<0.07	<0.07	<0.07	<0.70	
1,1,2-trichloroethane		<0.02	<0.02	<0.02	<0.02	<0.20	
1,1,2,2-tetrachloroet	hane	<0.03	<0.03	<0.03	<0.03	<0.30	
chloroethane		<0.52	<0.52	<0.52	<0.52	<5.2	
2-chloroethylvinyl et	her	<0.13	<0.13	<0.13	<0.13	<1.3	
chloroform		<0.05	<0.05	<0.05	<0.05	<0.50	
1,1-dichloroethene		<0.13	<0.13	<0.13	<0.13	<1.3	
trans-1,2-dichloroeth	ene	<0.10	<0.10	<0.10	<0.10	<1.0	
1,2-dichloropropane		<0.04	<0.04	<0.04	<0.04	<0.40	
trans-1,3-dichloropro	pene	<0.34	<0.34	<0.34	<0.34	<3.4	
cis-1,3-dichloroprope	ne	<0.20	<0.20	<0.20	<0.20	<2.0	
methylene chloride		3.6	<0.25	<0.25	<0.25	<2.5	
chloromethane		<0.08	<0.08	<0.08	<0.08	<0.80	
bromomethane		<1.18	<1.18	<1.18	<1.18	<11.8	
bromoform		<0.20	<0.20	<0.20	<0.20	<2.0	
bromodichloromethane		<0.10	<0.10	<0.10	<0.10	<1.0	
fluorotrichloromethan	e	<2.0	<2.0	<2.0	<2.0	<20	
dichlorodifluorometha	ne	<1.81	<1.81	<1.81	<1.81	<18.1	
chlorodibromomethane		<0.09	<0.09	<0.09	<0.09	<0.90	
tetrachloroethene		<0.03	<0.03	<0.03	<0.03	<0.30	
trichloroethene		<0.12	<0.12	0.27	<0.12	41	
vinyl chloride		<0.18	<0.18	<0.18	<0.18	<1.8	

<sup>\*</sup>Sample confirmed - results positive

NOTE: Due to low level artifacts present in the methanol used for internal standard preparation, all samples have been blank subtracted. The actual value of the blank has been reported.



QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED WATER SAMPLES

U-3986.3

	E&E	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86-		(ug/L)		Percent Recovery
2,4-D	D.I. Spike	<0.50	10.0	9.3	93
Silvex (2,4,5-TD)	D.I. Spike	<0.05	10.0	7.7	77
·					
	ļ	<b></b>	<u> </u>	<u> </u>	<b> </b>



# RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT PESTICIDES, PCBS, AND HERBICIDES

(all results in ug/L)

U-3986.4

	E&ELab. No.86-	81ank	7348	7349	7350			
Compound	Sample Identity	8/22/86	9010	9031	9073			
Aldrin		<0.05	<0.05	<0.05	<0.05			
a-BHC		<0.05	<0.05	<0.05	<0.05	1		
b-BHC		<0.05	<0.05	<0.05	<0.05			
g-8HC		<0.05	<0.05	<0.05	<0.05	1		
d-BHC		<0.05	<0.05	<0.05	<0.05			
Chlordane		<0.50	<0.50	<0.50	<0.50		1	Ì
4,4'-DDD		<0.10	<0.10	<0.10	<0.10	1		
4,4'-DDE		<0.10	<0.10	<0.10	<0.10	1	1	
4,4'-DDT		<0.10	<0.10	<0.10	<0.10			
Dieldrin		<0.10	<0.10	<0.10	<0.10	<b>{</b>	1	
Endosulfan I		<0.05	<0.05	<0.05	<0.05	1	j	
Endosulfan II		<0.10	<0.10	<0.10	<0.10	l	l	ĺ
Endosulfan sulfate		<0.10	<0.10	<0.10	<0.10	1		
Endrin		<0.10	<0.10	<0.10	<0.10	1	i	
Endrin aldehyde		<0.10	<0.10	<0.10	<0.10		i	
Heptachlor		<0.05	<0.05	<0.05	<0.05		ľ	
Heptachlor epoxide		<0.05	<0.05	<0.05	<0.05		i	
PCB - 1016		<0.50	<0.50	<0.50	<0.50		i	
PCB - 1221		<0.50	<0.50	<0.50	<0.50		Ì	
PCB - 1232		<0.50	<0.50	<0.50	<0.50	1		
PCB - 1242		<0.50	<0.50	<0.50	<0.50			
PCB - 1248		<0.50	<0.50	<0.50	<0.50			
PCB - 1254		<1.0	<1.0	<1.0	<1.0	ŀ		
PCB - 1260		<1.0	<1.0	<1.0	<1.0	1		
Toxaphene		<1.0	<1.0	<1.0	<1.0	ł	1	1
2,4-D		<0.50	<0.50	<0.50	<0.50			
2,4,5-TP (Silvex)		<0.05	<0.05	<0.05	<0.05	1		
2,4,5-T		<0.05	<0.05	<0.05	<0.05		1	l





#### LABORATORY REPORT

FOR

REESE AIR FORCE BASE

U-3986.5

	<del></del>		<del></del>			<del></del>		
Job No.: U-3986			RE: DF-2000					
Sample Date: 8/20/8	Sample Date: 8/20/86			P.O. No.:				
Date Received: 8/21/8				y: E&E	, Inc.			
Sample Type: Water	· · · · · · · · · · · · · · · · · · ·		Delivered	By: Feder	al Express			
E&E Lab. No. 86-	7348	7349	7350	Blank				
Customer No.	9010	9031	9073					
Sample Identity								
	Results in: mg/L ur					<b></b>		
Total Dissolved	740	440	000	<b></b>				
Solids Oil and Grease	0.4	660	900 2.3	NA NA				
Antimony	<0.4 <0.15	0.8 <0.15	<0.15	NA <0.15				
Beryllium	<0.01	<0.01	<0.01	<0.01				
Cadmium	<0.005	<0.005	<0.005	<0.005	•			
Chromium	<0.05	<0.05	<0.05	<0.05				
Copper	<0.02	<0.02	0.022	<0.02				
Lead	0.006	0.007	0.012	<0.005	ì			
Nickel	<0.1	<0.1	<0.1	<0.1				
Silver	<0.04	<0.04	<0.04	<0.04				
Thallium	<0.20	<0.20	<0.20	<0.20				
Zinc	0.248	0.071	0.374	<0.05		1		
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		1				[		
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	<u> </u>	<del> </del>	Ļ <u> </u>					

NA: Not Applicable

Analytical References:

"Methods for the Chemical Analysis of Water and Wastes," EPA-600/4-79-020, March 1983.

H - 399

Supervising Analyst:

Date: Octoby 9/192

# RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/L)

U-3986.8

	E & E Lab. No. 86-	7348	7349	7350	Method Blank	
Compound	Sample Identity	9010	9031	9073		
bis(2-chlorosthyl)ether		<10	<10	<10	<10	
1,3-dichlorobenzene		<10	<10	<10	<10	
1,4-dichlorobenzene		<10	<10	<10	<10	[
1,2-dichlorobenzene		<10	<10	<10	<10	1
bis(2-chloroisopropyl)ether		<10	<10	<10	<10	
N-nitrosodipropylamine		<10	<10	<10	<10	
hexachloroethane		<10	<10	<10	<10	
nitrobenzene		<10	<10	<10	<10	Į .
isophorone		<10	<10	<10	<10	
bis(2-chloroethoxy)methane		<10	<10	<10	<10	
1,2,4-trichlorobenzene		<10	<10	<10	<10	
naphthalene		<10	<10	<10	<10	İ
hexachlorobutadiene		<10	<10	<10	<10	ł
hexachlorocyclopentadiene		<10	<10	<10	<10	ł
2-chloronaphthalene		<10	<10	<10	<10	1
dimethyl phthalate		<10	<10	<10	<10	i
acenaphthylene		<10	<10	<10	<10	ì
fluorene		<10	<10	<10	<10	
acenaphthene		<10	<10	<10	<10	1
2,4-dinitrotoluene		<10	<10	<10	<10	
2,6-dinitrotoluene		<10	<10	<10	<10	İ
diethylphthalate		<10	<10	11	<10	ł
4-chlorophenyl phenyl ether		<10	<10	<u>&lt;10</u>	<10	Ĭ
N-nitrosodiphenylamine		<10	<10	<10	<10	
4-bromophenyl phenyl ether		<10	<10	<10	<10	ļ
hexachlorobenzene		<10	<10	<10	<10	
phenanthrene		<10	<10	<10	<10	1
anthracene		<10	<10	<10	<10	
di-n-butyl phthalate		<10	<10	<10	<10	
fluoranthene		<10	<10	<10	<10	
benzidine		<50	<50	<50	<50	ļ
pyrene		<10	<10	<10	<10	ľ
butyl benzyl phthalate		11	<10	<10	<10	!
3,3'-dichlorobenzidine		<30	<30	<30	<30	1
benzo(a)anthracene		<10	<10	<10	<10	1
bis(2-ethylhexyl)phthalate		57	160	80	<10	
chrysene		<10	<10	<10	<10	
di-n-octyl phthalate		<10	<10	<10	<10	
benzo(b)fluoranthene		<10	<10	<10	<10	
benzo(k)fluoranthene		<10	<10	<10	<10	
benzo(a)pyrene		<10	<10	<10	<10	
indeno(1,2,3-cd)pyrene		<10	<10	<10	<10	1
dibenzo(a,h)anthracene		<10	<10	<10	<10	i
benzo(ghi)perylene		<10	<10	<10	<10	1

<sup>\*</sup>Compound present below measurable detection limit.



# RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/L)

U-3986.9

	E & E Lab. No. 86-	7348	7349	7350	Method Blank	
Compound	Sample Identity	9010	9031	9073		
phenol		<10	<10	<10	<10	
2-chlorophenol		<10	<10	<10	<10	
2-nitrophenol	j	<10	<10	<10	<10	
2,4-dimethylphenol		<10	<10	<10	<10	
2,4-dichlorophenol	İ	<10	<10	<10	<10	
4-chloro-3-methylphenol		<10	<10	<10	<10	
2,4,6-trichlorophenol	İ	<10	<10	<10	<10	
2,4-dinitrophenol	i	<30	<30	<30	<30	
4-nitrophenol		<10	<10	<10	<10	
4,6-dinitro-2-methylphenol		<30	<30	<30	<30	
pentachlorophenol		<30	<30	<30	<30	

<sup>\*</sup>Compound present below measurable detection limit

U-3986.10

	E&E	Amount Added	Amount Determined		
Compound	Laboratory No. 86-	(ug/L)		Percent Recovery	
nitrobenzene-D5	7348	100	77	77	
	7349	100	69	69	
	7350	100	77	77	
2-fluorobiphenyl	7348	100	76	76	
1	7349	100	73	73	
	7350	100	92	92	
terphenyl-D14	7348	100	74		
cerpheny1-014	7349	100	71	71	
1	7350		66	66	
	7550	100	92	92	
pheno1-D5	7348	200	58	29	
1	7349	200	50	25	
	7350	200	68	34	
2-fluorophenol	7348	200	88	44	
- 12000 Sp. 1000	7349	200	100	50	
	7350	200	96	48	
2.6 ( 4.5)				İ	
2,4,6-tribromophenol	7348	200	90	45	
	7349	200	82	41	
	7350	200	131	65.5	

# QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

U-3986.11

		L.	Relative Percent	
Compound	E & E Lab. No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
bis(2-chloroethyl)ether		<10	<10	
1,3-dichlorobenzene		<10	<10	
1,4-dichlorobenzene		<10	<10	
1,2-dichlorobenzene		<10	<10	
bis(2-chloroisopropyl)ether		<10	<10	
N-nitrosodipropylamine		<10	<10	
hexachloroethane		<10	<10	
nitrobenzene		<10	<10	
isophorone		<10	<10	
bis(2-chloroethoxy)methane		<10	<10	
1,2,4-trichlorobenzene		<10	<10	
naphthalene	-	<10	<10	
hexachlorobutadiene		<10	<10	
hexachlorocyclopentadiene		<10	<10	
2-chloronaphthalene	}	<10	<10	
dimethyl phthalate		<10	<10	
acenaphthylene		<10	<10	
fluorene		<10	<10	
acenaphthene		<10	<10	
2,4-dinitrotoluene		<10	<10	
2,6-dinitrotoluene		<10	<10	
diethylphthalate		<10	<10	
4-chlorophenyl phenyl ether		<10	<10	
N-nitrosodiphenylamine		<10	<b>&lt;10</b>	
4-bromophenyl phenyl ether		<10	<10 <10	
hexachlorobenzene		<10	<10 <10	
phenanthrene		<10	ζ10 - ζ10	
anthracene		<10	₹10	
di-n-butyl phthalate		<10	₹10	
fluoranthene		<10	ξ10 ξ10	
benzidine		<50	<50	
pyrene		<b>&lt;10</b>	<10	i
butyl benzyl phthalate		11	11	
3,3'-dichlorobenzidine		< <del>11</del>	30	0
benzo(s)anthracene		<10	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
bis(2-ethylhexyl)phthalate		57		
chrysene		< <del>10</del>	<u>56</u> <10	1.8
di-n-octyl phthalate		<10	, , , , ,	
benzo(b)fluoranthene		<10	<10	
benzo(k)fluoranthene		<10 <10	<10	
benzo(a)pyrene		<10 <10	<10	
indeno(1,2,3-c,d)pyrene		<10 <10	<10	
dibenzo(a,h)anthracene			<10	
	]	<10	<10	
benzo(g,h,i)perylene	i	<10	<10	

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

San Green

U-3986.12

		u	ug/L		
Compound	E & E Lab. No. 86~ 7348	Original Analysis	Replicate Analysis	Percent Difference (RPD)	
phenol		<10	<10		
2-chlorophenol		<10	<10		
2-nitrophenol		<10	<10		
2,4-dimethylphenol		<10	<10		
2,4-dichlorophenol		<10	<10		
4-chloro-3-methylphenol		<10	<10		
2,4,6-trichlorophenol		<10	<10		
2,4-dinitrophenol		<30	<b>3</b> 0		
4-nitrophenol		<10	<10		
4,6-dinitro-2-methylphenol		<30	<30		
pentachlorophenol		<30	<30		

\*\*\*\*\*\*\*\*\*\*\*\*

SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-3986.13

Herb(7/E+30) Pest/PCB(7/E+40) Organophos(7/S+14) Phenols(7/E+30) tion Analysis Extraction Analysis Extraction Analysis	. Dead Anal Dead Extr Dead Anal Dead Extr Dead Anal Dead Extr D	8/27 9/26 8/29 8/27 8/22 10/1 8/28 8/27 8/22 9/3 8/25 8/27 8/22 9/21 8/28 8/27 9/26 8/29 8/27 8/22 10/1 8/28 8/27 8/22 9/3 8/25 8/27 8/28 9/21 8/28 8/27 9/26 8/29 8/27 8/22 10/1 8/28 8/27 8/22 9/3 8/25 8/27 8/28 9/21 8/28		PHENDL CONF. IRMATION DATE 7350 9/15
Herb(	a)	8/21 8/21 8/21,22 8/21,23		VOA CONF IRMATION DATE 8/21, 28 8/21, 28
V0A(14)	Dead	9/3		C0 7348 7349 7350
	Sample Sample Number Date	7348 8/20 7349 8/20 7350 8/20		
	Job Nu	3986	H <b>-4</b> 05	

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time expires.
Holding time based on sample date.
Holding time based on sample extraction. DEAD: EXTR: ANAL: ( ): S-4: E-4:



## RESULTS OF WATER ANALYSIS FOR PHENOLS BY GC

(all results in  $ug/\dot{L}$ )

	E & E Lab. No. 86-	Blank	7348	7349	7350*	
Compound	Sample Identity	8/22/86	9010	9031	9073	
phenol		<2.0	<2.0	<2.0	<2.0	
2-chlorophenol		<2.0	<2.0	<2.0	<2.0	
2-nitrophenol		<2.0	<2.0	<2.0	<2.0	
2,4-dimethylphenol		<2.0	<2.0	<2.0	<2.0	
2,4-dichlorophenol		<2.0	<2.0	<2.0	<2.0	
4-chloro-3-methylphenol		<2.0	<2.0	<2.0	<2.0	
2,4,6-trichlorophenol		<2.0	<2.0	<2.0	<2.0	
2,4-dinitrophenol		<13.0	<13.0	<13.0	<13.0	
4-nitrophenol		<5.0	<5.0	<5.0	<5.0	
4,6-dinitro-2-methylphenol		<16.0	<16.0	<16.0	<16.0	
pentachlorophenol		<7.4	<7.4	<7.4	<7.4	





<sup>\*</sup>Sample confirmed - results negative.

## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED WATER SAMPLES

	E & E	Original Value	Amount Added	Amount Determined	
Perameter	Laboratory No. 86~		Percent Recovery		
pheno1	Blank Spike	<2.0	40	17.7	44.3
2-chlorophenol	Blank Spike	<2.0	40	39.7	99.2
2-nitrophenol	Blank Spike	<2.0	40	38.3	95.7
2,4-dimethylphenol	Blank Spike	<2.0	40	40.8	102
2,4-dichlorophenol	Blank Spike	<2.0	40	42.0	105
4-chloro-3-methylphenol	Blank Spike	<2.0	40	44.8	112
2,4,6-trichlorophenol	Blank Spike	<2.0	40	43.6	109
2,4-dinitrophenol	Blank Spike	<13.0	40	48.8	122
4-nitrophenol	Blank Spike	<5.0	40	17.5	43.8
4,6-dinitro-2-methylphenol	Blank Spike	<16.0	40	44.4	111
pentachlorophenol	Blank Spike	<7.4	40	46.0	115

9.5 (\$1.00 to 1)

QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED WATER SAMPLES

	E & E	Original Value	Amount Added	Amount Determined	Percent	
Parameter	Laboratory No. 86-		(mg/L)			
Oil and Grease	D.I. Spike	<0.2	7.4	10.3	139	
		:				
	;					

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

	(п	Relative	
E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
7298*	<0.005	<0.005	
7298*	<0.05	<0.05	
7298*	0.023	0.022	4.4
7298*	0.019	0.020	5.1
7298*	<0.1	<0.1	
7298*	0.209	0.219	4.7
7349	660	680	3.0
	7298* 7298* 7298* 7298* 7298* 7298*	E & E Laboratory No. 86-  7298*  7298*  7298*  0.005  7298*  0.023  7298*  0.019  7298*  0.209	Laboratory No. 86-     Original Analysis     Replicate Analysis       7298*     <0.005

<sup>\*</sup>This represents 10% QC. This is not one of your samples but was analyzed in the same batch as your samples.



## QUALITY CONTROL. FOR ACCURACY: PERCENT DIFFERENCE--EPA QUALITY ASSURANCE MATERIALS

	Concentra	Concentrations in ug/L			
Parameter	Known	Determined	Percent Difference		
Antimony	990	1112	12.3		
Beryllium	960	1006	4.8		
Cadmium	940	963	2.4		
Chromium	1030	1056	2.5		
Copper	1030	1042	1.2		
Lead	53.0	50.0	5.7		
Nickel	1020	1040	2.0		
Silver	6000	6152	2,5		
Thallium	25.0	25.2	0.8		
Zinc	1010	1024	1.4		
		<u> </u>	<u> </u>		



## SAMPLE IDENLIF (CATION CROSS -REFERENCE

U-4-184

Laboratory Number 86-	Field Number	field toeation
8329	9011	0165-PG-001-GP-86-9011
8330	9032	01 65 -PG -902 -GP -86 -90 32
8331	90 74	0165-PG-004-GP-86-9074



# SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-4184.1

Pet HC(28)	Anal	111
o.	Dead	
(8238)	Anal	9,30
280	Dead	10,22
(2) 501	Anal	9,79
Sill	Dead	10,2 10,2 10,2
ď	inal	10,7 10,7 10,7 10,7 10,7 10,7 10,7 10,7
+ 40) Apalyais	Dead	9,11
BVA(7.E	اے	000 000 000 000
BYA(7	Deed	01-00-01-00-01-00-01-00-01-01-01-01-01-0
30) Analysis	Anal	
5 + 30)	Dead	111
PAH (7,5 + 30)	Extr	111
PAH (	Dead	
	Sample Date	9,25
	Sample	8330 8331 8331
	gç	U-4184

DEAD: EXTR: ANAL: ( ): S+#: E+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time.
Holding time expiration based on sample date.
Holding time expiration based on extraction date.



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	S I	2 000 000 000 000	·
E-30)	Analysis	Dead 10/31 10/31	
Phenols(7/E-30)	tion	10/1 10/1 10/1	
Phe	Extraction	Dead 10,2 10,2 10,2	
	vsis	Ana1 10/2 10/2 10/2	
Organophos(7/5+14)	Analysis	Dead 10,9 10,9	
anophos	Extraction	9/30 9/30 9/30	
Oro	Extra	Dead 10,2 10,2 10,2	
	Analysis	Ana1 10/1 10/1 10/1	
7.(E+40)	Ana	Dead 11/9 11/9	
Pest/PCB(7/E+40)	Extraction	9/30 9/30 9/30 9/30	
الق	Extra	10/2 10/2 10/2	
	Analysis	Anal 10/2 10/2 10/2	
Herb(7/E+30)	Ana	10/30 10/30 10/30	
Herb(	M۵	9/30 9/30 9/30	
		Dead 10/2 10/2 10/2	NOIL
	704(14)	9,29 9,29 9,29 9,29	VOA CONF IRMATION DATE 10/1 10/1
		10/9 10/9 10/9	
	Sample		8329 8330 8331
	Sample	Number 8329 8331 8331	
	Job	U-4184	

DEAD:
EXTR:
ANAL:
( ):
S+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time expires.
Holding time based on sample date.
Holding time based on sample extraction.

recycled paper



## RESULTS OF WATER ANALYSTS FOR PRIORITY PULLUTANT PURGEABLE ARCHAILC COMPUUNDS BY CC

(all results in ug/L)

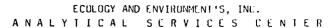
U-4184.3

	E & E Lab. No. 86-	Blank	8329	8330*	8331*	
Com po und	Sample Identity	9/29/86	9011	9032	90 74	
c hl orobenzene		<0.20	<0.20	<0.20	<0.20	
1,2-dichlorobenzene		<0.40	<0.40	<0.40	<0.40	
1,3-dichlorobenzene		<0.40	<0.40	<0.40	<().40	
1,4-dichlorobenzene		<0.30	<0.30	<0.30	<0.30	
b en zen e		<0.20	<0.20	<0.20	<0.20	
total xylenes		<1.0	<1.0	<1.0	<1.0	
toluene	ł	<0.20	<0.20	<u>0.47</u>	0.88	Ì
e thylbenzene		<0.20	<0.20	<0.20	<0.20	

<sup>\*</sup>Sample confirmed - results positive.

groom services incorporation accorded processes and processes according to the processes processes





# RESULIS OF WATER ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/L)

U-4184.4

	E & E Lab. No. 86-	Biank	BLank	8329*	8330*	83314	
Compound	Sample Identity	9/29/86	9/30/86	9011	9032	9074	
carbon tetrachloride		<0.12	<0.12	<0.12	<0.12	<1.2	
1,2-dichloroethane		<0.03	<0.03	<0.03	<0.03	<0.30	
1,1,1-trichloroethane		<0.03	<0.03	1,9	<0.03	<0.30	
1,1-dichloroethane		<0.07	<0.07	0.18	0.15	<0.70	1
1,1,2-trichloroethane		<0.02	<0.02	<0.02	<0.02	<0.20	1
I, 1, 2, 2-tetrachloroeta	nane	<0.03	<0.03	<0.03	<0.03	<0.30	
chloroethane		<0.52	<0.52	<0.52	<0.52	45.2	1
2-chloroethylvinyl eth	ner (	<0.13	<0.13	<0.13	<0.13	<1.5	1
chloroform		0.08	<0.05	<0.05	<0.05	<0.50	1
1,1-dichloroethene		<0.13	<0.13	<0.13	<0.13	<1.3	1
trans-1,2-dichloroethe	ene	<0.10	<0.10	<0.10	<0.10	<1.0	1
1,2-dichloropropane		<0.04	<0.04	<0.04	<0.04	<0.40	
trans-1,3-dichloroprop	ene	<0.34	<0.34	<0.34	<0.34	<3.4	(
cis-1,3-dichloroproper	ne (	<0.20	<0.20	<0.20	<0.20	<2.0	
methylene chloride		<0.25	<0.25	2.6	<0.25	<2.5	[
chloromethane	1	<0.08	<0.08	<0.08	<0.08	<0.80	<u> </u>
bromomethane	[	<1.18	<1.18	<1.18	<1.18	<12	ĺ
bromuform	J	<0.20	<0.20	<0.20	<0.20	<2.0	
bromodichloromethane		<0.10	<0.10	<0.10	<0.10	<1.0	
fluorotrichloromethane	fluorotrichloromethane		<2.0	<2.0	<2.0	<20	Ì
dichlorodifluoromethane		<1.81	<1.81	<1.81	<1.81	<18	
chlorodibromomethane	chlorodibromomethane		<0.09	<0.09	<0.09	<0.90	
tetrachloroethene		<0.03	<0.03	<0.03	<0.03	<0.36	•
trichloroethene	į	<0.12	0.32	0.22	<0.12	24	
vinyl chloride	ľ	<0.18	<0.18	<0.18	<0.18	<1.8	

NOTE: Due to low level artifacts present in the methanol used for internal standard preparation, all samples have been blank subtracted. The actual value of the blank has been reported.

<sup>\*:</sup> Sample confirmed - results positive.



## RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/L)

U-4184.8

	E & E Lab. No. 86-	8329	8330	8331	Method Blank	
Compound	Sample Identity	9011	9032	9074		
phenol		<10	<10	<10	<10	
2-chlorophenol		<10	<10	<10	<10	
2-nitrophenol		<10	<10	<10	<10	
2,4-dimethylphenol		<10	<10	<10	<10	
2,4-dichlorophenol		<10	<10	<10	<10	
4-chloro-3-methylphenol		<10	<10	<10	<10	
2,4,6-trichlorophenol		<10	<10	<10	<10	
2,4-dinitrophenol	1	<30	<30	<30	<30	
4-nitrophenol	(	<10	<10	<10	<10	
4,6-dinitro-2-methylphenol		<30	<30	<30	<30	
pentachlorophenol		<30	<30	<30	<311	

<sup>\*</sup>Compound present below measurable detection limit.



" Rail

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y I I C A L S E R V I C E S C E N I L R

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## RESULTS OF WATER ANALYSIS FOR PRIDRITY PULLUTANT BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in uq/L)

	E & E Lab. No. 86-	8329	8330	8331	Method Blank	
Compound	Sample Identity	9011	9032	9074		
bis(2-chloroethy1)ether		<10	<10	<10	<10	
1,3-dichlorobenzene		<10	<10	<10	<10	1
1,4-dichlorobenzene		<10	<10	<10	<10	
1,2-dichlorobenzene		<10	<10	<10	<10	
bis(2-chloroisopropyl)ether		<10	<10	<10	<10	
N-nitrosodipropylamine		<10	<10	<10	<10	
hexachloroethane		<10	<10	<10	<10	
nitrobenzene		<10	<10	<10	<10	1
isophorone		<10	<10	<10	<10	
bis(2-chloroethoxy)methane		<10	<10	<10	<10	1
1,2,4-trichlorobenzene		<10	<10	<10	<10	1
naphthalene		<10	<10	<10	<10	İ
hexachlorobutadiene		<10	<10	<10	<10	Ì
hexachlorocyclopentadiene		<10	<10	<10	<10	-
2-chloronaphthalene		<10	<10	<10	<10	]
dimethyl phthalate		<10	<10	<10	<10	1
acenaphthylene		<10	<10	<10	<10	İ
fluorene		<10	<10	<10	<10	İ
scenaphthene		<10	<10	<10	<10	1
2,4-dinitrotaluene	Ï	<10	<10	<10	<10	
2,6-dinitrotoluene		<10	<10	<10	<10	1
diethylphthalate	i	<10	<10	<10	<10	1
4-chlorophenyl phenyl ether		<10	<10	<10	<10	
N-nitrosodiphenylamine		<10	<10	<10	<10	
4-bromophenyl phenyl ether	İ	<10	<10	<10	<10	
hexachlorobenzene		<10	<10	<10	<10	
phenanthrene		<10	<10	<10	<10	İ
anthracene	ĺ	<10	<10	<10	<10	<b>i</b>
di-n-butyl phthalate	ſ	26	36	17	22	1
fluoranthene		<10	<1i)	<10	<10	
benzidine		<50	<50	<50	<50	
pyrene		<10	<10	<10	<10	[ [
butyl benzyl phthalate		<10	<10	<11)	<10	[
3,3'-dichlorobenzidine		<30	<30	< 3()	<30)	
benzo(a)anthracene	ſ	<10	<10	<10	<10	[ [
bis(2-ethylhexyl)phthalate		25	93	<113*	<10	[
chrysene	t	<10	<10	<10	<10	
di-n-octyl phthalate	Į	<10	<10	<10	<10	
benzo(b)fluoranthene	ļ	<10	<10	<10	<10	
benzo(k)fluoranthene	Ī	<10	<10	<10	<10	
benzo(a)pyrene	Í	<10	<10	<10	<h)< th=""><th>[</th></h)<>	[
indena(1,2,3-cd)pyrene	Į.	<10	<10	<10	<b>Ç</b> 10	]
dibenzo(a,h)anthracene	[	<10	<10	<10	<10	
benzo(ghi)perylene	ĺ	<10	<10	<10	<10	1
		1	i			

<sup>\*</sup>Compound present below measurable detection limit.



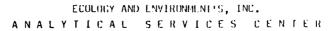
## RESULTS OF WATER ANALYSTS FOR PRIORITY POLLUTANT PESTICIDES, PCBs AND HERBICIDE BY GC (all results in ug/L)

	E & E Lab. No. 86-	81 ank	8329	8330	8331			
Compound	Sample Identity	9/30/86	9011	9032	9074			
Aldrin		<0.05	<0.05	<0.05	<0.05			
a-8HC		<0.05	<0.05	<0.05	<0.05			
b-BHC		<0.05	<0.05	<0.05	<0.05			
g-BHC		<0.05	<0.05	<0.05	<0.05			1
d-BHC		<0.05	<0.05	<0.05	<0.05	1		
Chlordane	ĺ	<0.50	<0.50	<0.50	<0.50		1	1
4,4'-DDD		<0.10	<0.10	<0.10	<0.10	1		}
4,4'-DDE	ĺ	<0.10	<0.10	<0.10	<0.10		i	
4,4'-DDT	ĺ	<0.10	<0.10	<0.10	<0.10	•		
Dieldrin		<0.10	<0.10	<0.10	<0.10		1	
Endosulfan I		<0.05	<0.05	<0.05	<0.05	1		
Endosuifan II		<0.10	<0.10	<0.10	<0.10		)	
Endosulfan sulfate		<0.10	<0.10	<0.10	<0.10	1		
Endrin		<0.10	<0.10	<0.10	<0.10		j	
Endrin aldehyde		<0.10	<0.10	<0.10	<0.10	ļ	1	
Heptachlor		<0.05	<0.05	<0.05	<0.05			ļ
Heptachlor epoxide		<0.05	<0.05	<0.05	<0.05		1	1
PCB - 1016		<0.50 }	<0.50	<0.50	<0.50	)	Ì	ļ
PCB - 1221		<0.50	<0.50	<0.50	<0.50	Ì		
PCB - 1232		<0.50	<0.50	<0.50	<0.50		•	
PCB - 1242		<0.50	<0.50	<0.50	<0.50		1	1
PCB - 1248		<0.50	<0.50	<0.50	<0.50	ļ	ļ	1
PCB - 1254		<1.0	<1.0	<1.0	<1.0			
PCB - 1260	j	<1.0	<1.0	<1.0	<1.0		]	J
Toxaphene	•	<1.0	<1.0	<1.0	<1.0			1
2,4-D		<0.50	<0.50	<0.50	<0.50			
2,4,5-IP (Silvex)	ì	<0.05	<0.05	<0.05	<0.05			
2,4,5-1	1	<0.05	<0.05	<0.05	<0.05	ł	1	1

## RESULTS OF WATER ANALYSIS FOR PHENOLS BY CC

(all results in ug/L)

	E & F. Lab. No. 86-	Blank	8329	8330	H 5 5 1	
Compound	Sample Identity	10/1/86	9011	9032	9074	
phenol		<5.0	<5.0	<5.0	<5.0	
2-chlorophenol		<5.0	<5.0	<5.0	<5.0	
2-nitrophenol		<5.0	<5.0	<5.0	<5.0	
2,4-dimethylphenol		<5.0	<5.0	<5.0	<5.0	
2,4-dichlorophenol		<5.0	<5.0	<5.0	<5.0	
4-chloro-3-methylphenol		<5.0	<5.0	<5.0	<5.0	
2,4,6-trichlorophenol		<5.0	<5.0	<5.0	<5.0	
2,4-dinitrophenol		<13	<13	<13	<13	
4-nitrophenol		<5.0	<5.0	<5.0	<5.0	
4,6-dinitro-2-methylphenol		<16	<16	<16	<16	
pentachlorophenol		<7.4	<7.4	<7.4	<7.4	





## RESULTS OF WATER ANALYSIS FOR ORGANOPHOSPHOROUS PESTICIDES BY GC

(all results in ug/L)

	E & E Lab. No. 86-	8329	8330	8331	Blank		
Compound	Sample Identity	9011	9032	9074	9/30/86		
Naled		<0.10	<0.10	<0.10	<0.10		
Phorate		<0.15	<0.15	<0.15	<0.15	!	
Disulfoton		<0.20	<0.20	<0.20	<0.20		
Chlorpyrifos		<0.30	<0.30	<0.30	<0.30		
Dimethoate		<0.30	<0.30	<0.30	<0.30		
Malathion		<0.30	<0.30	<0.30	<0.30		
Mevinphos		<0.30	<0.30	<0.30	<0.30		, T.S.
Parathion		<0.30	<0.30	<0.30	<0.30		_
Methyl parathion		<0.30	<0.30	<0.30	<0.30		
Diazinon		<0.60	<0.60	<0.60	<0.60		
Methyl azinphos		<1.5	<1.5	<1.5	<1.5		





#### LABORATORY REPORT

FUR

#### REESE AIR FURCE BASE

U-4184.10

Job No.:	U-4184		RE:	DF - 21	000	
Sample Date:	9/25/86		P.O. No.:			
Date Received:	9/26/86		Sampled (	By: E&i	E, Inc.	
Sample Type:	Water		Delivered	f By: Fede	ral Express	
E & E Lab. No. 86-	8329	8330	8331	Blank		
Customer No.	9011	9032	9074			
Sample Identity						
			Results in	mg/L		
Total Dissolved						
Solids	270	700	1300	NΛ	i	
Oil and Grease	0.	0.6	1.6	NA NA		•
Antimony	<0.15	<0.15	<0.15	<0.15		
Beryllium	<0.01	<0.01	<0.01	<0.01		Ì
Cadmium	<0.01	<0.01	<0.01	<0.01	]	<u> </u>
Chromium	<0.05	<0.05	<0.05	<0.05	)	1
Copper	<0.02	<0.02	<0.02	<0.02	İ	}
Lead	0.007	<0.005	0.008	<0.005		
Nickel	<0.1	<0.1	<0.1	<0.1		
Silver	<0.04	<0.04	<0.04	<0.04	}	<u> </u>
Thallium	<0.20	<0.20	<0.20	<0.20		
Zine	<0.05	<0.05	0.548	<0.05		

NA:	Not	applicable.
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Analytical References:

"Methods	for	the	Chemical	Analysis of	f Water	and Wastes",	EPA-600/4-79-020.	Harrh	1983.
						H-421	/		

Superv	ising Analysti	 	· ·	<i>,</i> · · ·
Date:	- Marian	, . ,		

## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED WATER SAMPLES

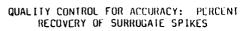
٤	E & E Laboratory	Original Value	Amount Added	Amount Determined	
Compound	No. 86- 8329		(ug/L	)	Percent Recovery
1,2-dichlorobenzene		<0.40	10.0	9.4	94
1,3-dichlorobenzene		<0.40	10.0	9.4	94
1,4-dichlarabenzene		<0.30	10.0	9.3	93
benzene		<0.20	10.0	8.0	80
toluene		<0.20	10.0	9.3	93
ethyl benzene		<0.20	10.0	9.3	93

## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY OF SURROGATE SPIKES

U-4184.12

	E&E	Amount Added	Amount Determined	
Compound	Laboratory No. 86-	(1)	g/L)	Percent Recovery
Pheno1-05	8329 8330 8331	200 200 200	62 54 43	31 27 22
2-Fluorophenol	8329 8330 8331	200 200 200	135 120 105	68 60 53
2,4,6-Tribromophenol	8329 8330 8331	200 200 200	110 104 108	55 52 54
	:			

These recoveries are acceptable to EPA Contract Lab Program (CLP)  $\operatorname{quide-lines}_{\bullet}$ 



U-4184.11

	E&E	Amount Added	Amount Determined		
Compound	No. 86-	(1.	ıg/L)	Percent Recovery	
Nitrobenzene-D5	8329 8330 8331	100 100 100	54 72 72	54 72 72	
2-Fluorobiphenyl	8329 8330 8331	100 100 100	56 71 70	56 71 70	
Terphenyl-D14	8329 8330 8331	100 100 100	61 73 73	61 73 73	
	8521	100	,,		

These recoveries are acceptable to EPA Contract Lab Program (CLP) guidelines.



	E & E Laboratory	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86- DI Spike		(ug/L	)	Percent Recovery
2,4-0		<0.50	10.0	8.8	88
Silvex (2,4,5-TP)		<0.05	10.0	7.6	76
	:				
				Í	
				;	
			}		
					į

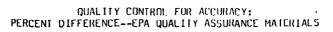


#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

		(mg/	(L)	Relative
Parameter	E & E Laboratory No. 86-	Original Analysis	Replicate Analysis	Percent Difference (RPD)
Total Dissolved Solids	8328*	320	310	3.2
Antimony	8331	<0.15	<0.15	
Beryllium	8331	<0.01	<0.01	
Cadmium	8331	<0.01	<0.01	
Chromium	8331	<0.05	<0.05	
Copper	8331	<0.02	<0.02	
Lead	8331	0.008	0.008	0
Nickel	8331	<0.1	<0.1	
Silver	8331	<0.04	<0.04	
Thallium	8331	<0.20	<0.20	
Zinc	8331	0.548	0.540	1.5
			ĺ	
•				

<sup>\*</sup>This represents 10% QC. This is not one of your samples but was analyzed in the same batch as your samples.





	Concentra	tions in ug/L		
Parameter	Known	Determined	Percent Difference	
Antimony	990	1112	12.3	
Beryllium	960	1006	4.8	
Cadmium	940	999	6,3	
Chromium	1030	1024	0,6	
Copper	1030	1030	0	
Lead	17.0	17.3	1.8	
Nickel	1020	1009	1.1	
Silver	6000	6152	2.5	
Thallium	25.0	25.2	0.8	
Zinc	1010	1061	5.0	
Oil and Grease	13,200	16,400	24.2	



## SAMPLE IDENTIFICATION CROSS -REFERENCE

U-4195

Laboratory Number 86-	Field Number	firld Location
8364	9008	0165-NP-001-GN-86-9008
8365	9009	0165-NP-001-GN-86-9009
8366	9044	0165-NP-002-GN-86-9044
8367	9045	0165-NP-002-GN-86-9045
8368	9200	0165-PG-000-GP-86-9200
8369	9140	0165-PG-005-GP-86-9140
8385	9140	0165-PG-005-GP-86-9140
	•	

SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

recy, and paper

	\$18	Anal	10/5	.c/01 .c/01 .c/01 .c/01 .c/01							
/E+30)	Analysis	Dead	10/31	20000	<u>.</u>		 				
Phenols (7/E+30)	ction	Extr	10/1	, , , , , , , , , ,	·						
£l	Extraction	Dead	10/3	2000	· ·						
<u> </u>	818	Anal	10/2	10/2 10/3 10/3 10/3		•				·	
Organophos (7/5+14)	Analysis	Dead	10/10	10/10 10/10 10/10 10/10							
anophos	Extraction	Extr	9/30	9/30 9/30 9/30 9/30							
밁	Extra	Dead	10/3	10/3 10/3 10/3							
	518	Anal	10,71	10/1 10/2 10/2		_					
Pest/PCB(7/E+40)	Analysis	Dead	11/9	11/9	•						
st/PCB(	ction	Extr	9/30	9/30 9/30 9/30 9/30							
اق	Extraction	Dead	10/3	10/3 10/3 10/3							<u> </u>
	518	Anal	10/2	10/2 10/2 10/2 10/2							
/E+30)	Analysis	Dead	10/30	10/30 10/30 10/30 10/30							
Herb(7,	Extraction	Extr	9/30	9/30 9/30 9/30 9/30							
	Extr	Dead		10/3 10/3 10/3							
	VOA (14)	Anal	9/29,10/1	9/29, 10/1 9/29, 9/30 9/29, 10/1 9/29, 9/30					VOA	Confirmation Date	10/1
	VO A	Dead	10/10	10/10	!		 				
	Samo	Date	9/26	9/26 9/26 9/26 9/26			 				8364 8365 8367 8368 8369
-	Samole	Number	8364	8365 8367 8367 8368 8369			 <del></del>				
 arıar	4	200	U-4195			-	H-429	)			document of the form

DEAD: EXTR: ANAL: ( ): S+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time expires.
Holding time based on sample date.
Holding time based on sample extraction.

# SAMPLE TRACKING OF ANALYSES REQUIRING HOLDING TIMES

U-4195.2

<u> </u>	
Pet. HC(28)	
Pet.	
0&G(28)	9/30 9/30 9/30 9/30 9/30
980	10/24 10/24 10/24 10/24 10/24
(1) 501	55555 15
100	10,7 10,7 10,7 10,7 10,7 10,7 10,7 10,7
Analysis	10/8 10/8 10/8 10/8 10/8 10/8
+ 40) Anal	
BNA (7/E + 40)  Extraction Ana	10/2 10/2 10/2 10/2 10/2
Extra	201 201 201 201 201 201 201 201 201 201
30) Analysis	11111
PAH (7/5 + 30) ction Anal	1 1 1 1 1 1
Extraction	11111
Extra	11111
Sample	9/26 9/26 9/26 9/26 9/26 9/30 9/30
Sample	8364 8365 8367 8369 8369 8389
ą	4195

DEAD: EXTR: ANAL: ( ): S+#: E+#:

Date sample holding time expires.
Date sample was extracted.
Date sample was analyzed.
Holding time.
Folding time expiration based on sample date.
Holding time expiration based on sample date.



## RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/L)

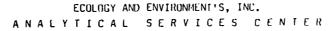
	E & E Lab. No. 86-	81 ank	8364	8365	8366	8367
Compound	Sample Identity	9/29/86	9008	9009	9044	9045
chlorobenzene		<0.20	<0.20	<0.20	<0.20	<0.20
1,2-dichlorobenzene		<0.40	<0.40	<0.40	<0.40	<0.40
1,3-dichlorobenzene		<0.40	<0.40	<0.40	<0.40	<0.40
1,4-dichlorobenzene		<0.30	<0.30	<0.30	<0.30	<0.30
benzene		<0.20	<0.20	<0.20	<0.20	<0.20
total xylenes		<1.0	<1.0	<1.0	<1.0	<1.0
toluene		<0.20	<0.20	<0.20	<0.20	<0.20
ethy ibenzene		<0.20	<0.20	<u. 20)<="" td=""><td>&lt;0.20</td><td><u.2u< td=""></u.2u<></td></u.>	<0.20	<u.2u< td=""></u.2u<>

## RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT PURGEABLE AROMATIC COMPOUNDS BY GC

(all results in ug/L)

	E & E Lab. No. 86-	8368*	8369*	Blank		
Compound	Sample Identity	9200	9140	9/30/86		
chlorobenzene	<del>-</del>	1.5	<0.20	<0.20		
1,2-dichlorobenzene		<0.40	<0.40	<0.40		
1,3-dichlorobenzene		<0.40	<0.40	<0.40		
1,4-dichlorobenzene		<0.30	<0.30	<0.30	;	
benzene		<0.20	<0.20	<0.20	İ	
total xylenes		<1.0	<1.0	<1.0		
toluene		<u>0.34</u>	1.2	<0.20	İ	
ethylbenzene		<0.20	<0.20	<0.20		

<sup>\*</sup>Sample confirmed - results positive.



## RESULTS OF WATER ANALYSIS FOR PURGEABLE HALOCARBON COMPOUNDS BY GC (all results in ug/L)

U-4195.28

	Sample Identity					l	
carbon tetrochloride		9/30/86	10/1/86	9008	9009	9044	9045
Caroon cectachitoride		<u.12< th=""><th>&lt;0.12</th><th>&lt;0.60</th><th>&lt;0.60</th><th>&lt;0.12</th><th>&lt;0.24</th></u.12<>	<0.12	<0.60	<0.60	<0.12	<0.24
1,2-dichloroethane		<0.03	<0.03	<0.15	<0.15	<0.03	<0.06
1,1,1-trichloroethane		<0.03	<0.03	7.1	3.9	<0.03	1.6
1,1-dichloroethane	1	<0.07	<0.07	<0.35	<0.35	<0.07	<0.14
1,1,2-trichloroethane	1	<0.02	<0.02	<0.10	<0.10	<0.02	<0.04
1,1,2,2-tetrachloroetha	ne	<0.03	<0.03	<0.15	<0.15	<0.03	<0.06
chloroethane	1	<0.52	<0.52	<2.6	<2.6	<0.52	<1.0
2-chloroethylvinyl ether	r	<0.13	<0.13	<0.65	<0.65	<0.13	<0.26
chloroform	1	<0.05	<0.05	<0.25	<0.25	<0.05	<0.10
1,1-dichloroethene	1	<0.13	<0.13	<0.65	<0.65	<0.13	<0.26
trans-1,2-dichloroethen	e	<0.10	<0.10	<0.50	<0.50	<0.10	<0.20
1,2-dichloropropane	1	<0.04	<0.04	<0.20	<0.20	<0.04	<0.08
trans-1,3-dichloroprope	ne	<0.34	<0.34	<1.7	<1.7	<0.34	<0.68
cis-1,3-dichloropropene	ſ	<0.20	<0.20	<1.0	<1.0	<0.20	<11,41)
methylene chloride	1	<0.25	<0.25	110	<u>98</u>	<0.25	27
chloromethane	l	<0.08	<0.08	<0.40	<0.40	<0.08	<0.16
b romome thane	ļ	<1.18	<1.18	<5 <b>.</b> 9	<5.9	<1.18	<2.4
bromoform	ŀ	<0.20	<0.20	<1.0	<1.0	<0.20	<0.40
bromodichloromethane	į	<0.10	<0.10	<0.50	<0.50	<0.10	<0.20
fluorotrichloromethane	1	<2.0	<2.0	<10	< 10	<2.0	<4.0
dichlorodifluoromethane		<1.81	<1.81	<9.0	<9.0	<1.81	< 5.6
chlorodibromomethane	}	<0.09	<0.09	<0.45	<n.45< th=""><th>&lt;0.09</th><th>&lt;0.18</th></n.45<>	<0.09	<0.18
tetrachloroethene	ŀ	<0.03	<0.03	2.6	1.7	<0.03	0.98
trichloroethene	(	0.56	<0.12	<0.60	<0.60	<0.12	<11.24
vinyl chloride		<0.18	<0.18	<0.90	<0.90	<0.18	<0.36

<sup>\*</sup>Sample confirmed - results psoitive.

NOTE: Due to low level artifacts present in the methanol used for internal standard preparation, all samples have been blank subtracted. The actual value of the blank has been reported.

# RESULTS OF WATER ANALYSIS FOR PURCEABLE HALOCARBON COMPOUNDS BY CC (all results in ug/L)

		<del></del>	<del> </del>	+	+		U-4195.6
	E & E Lab. No. 86-	8368*	8369+				
Compound	Sample Identity	9200	9140				
carbon tetrachloride		<0.12	<0.12				
1,2-dichloroethane	į	<0.03	<0.03		(	j	Í
1,1,1-trichloroethane	1	<0.03	<0.03	į.	ļ	1	
1,1-dichloroethane	ľ	<0.07	<0.07				Ţ
1,1,2-trichloroethane	į	<0.02	<0.02	ł		1	
1,1,2,2-tetrachloroeth	nane	<0.03	<0.03	1	1		
chloroethane	ĺ	<0.52	<0.52	(	1	1	
2-chloroethylvinyl eth	ner j	<0.13	<0.13	1	j		
chloroform	Į	2.6	<0.05	ſ	ĺ	1	1
1,1-dichloroethene		<0.13	<0.13	!	}		1
trans-1,2-dichloroethe	ene	<0.10	<0.10	İ	ļ.	1	1
1,2-dichloropropane	{	<0.04	<0.04	}	1	-	1
trans-1,3-dichloroprop	ene	<0.34	<0.34	ţ	(		į.
cis-1,3-dichloroproper	ne (	<0.20	<0.20	(	1	{	{
methylene chloride	1	<0.25	<0.25		{		Ì
chloromethane	ſ	<0.08	<0.08		[	j	
bromomethane	1	<1.18	<1.18		ļ		
bromoform	1	<0.20	<0.20				
bromodichloromethane	ł	<0.10	<0.10	•	į	1	
fluorotrichloromethane	. [	<2.0	<2.0			(	
dichlorodifluoromethan	ie	<1.81	<1.81			1	
chlorodibromomethane	ţ	<0.09	<0.09				
tetrachloroethene	1	<0.03	<0.03	i	İ	{	
trichloroethene	1	<0.12	<0.12		Í		
vinyl chloride		<0.18	<0.18				{
	-					}	1

<sup>\*</sup>Sample confirmed - results positive. +Sample confirmed - results negative.

NOTE: Due to low level artifacts present in the methanol used for internal standard preparation, all samples have been blank subtracted. The actual value of the blank has been reported.

## RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/L)

	E & E Lab. No. 86-	8364	8365	8366	8367	8368
Compound	Sample Identity	9008	9009	9044	9045	9200
pheno l		<10	<10	<10	<1U	<10
2-chlorophenol		<10	<10	<10	<10	<10
2-nitrophenol		<10	<10	<10	<10	<10
2,4-dimethylphenol		<10	<10	<10	<10	<10
2,4-dichlorophenol		<10	<10	<10	<10	<10
4-chloro-3-methylphenol		<10	<10	<10	<10	<10
2,4,6-trichloraphenal		<10	<10	<10	<10	<10
2,4-dinitrophenol		<30	<30	<30	<30	<30
4-nitrophenol		<10	<10	<10	<10	<10
4,6-dinitro-2-methylphenol		<30	<30	<30	<30	<30
pentachlorophenol	ĺ	<30	<30	<30	<30	<30



## RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT ACID EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/L)

	E & E Lab. No. 86-	8369	Method Blank		
Compound	Sample Identity	9140			
phenol		<10	<10		
2-chlorophenol		<10	<10		ĺ
2-nitrophenol		<10	<10		•
2,4-dimethylphenol		<10	<10		i
2,4-dichlorophenol		<10	<10		j
4-chloro-3-methylphenol		<10	<10		
2,4,6-trichlorophenal		<10	<10		
2,4-dinitrophenal		<30	<30		
4-nitrophenol		<10	<10		
4,6-dinitro-2-methylpheno		<30	<30		
pentachlorophenol		<30	<30		

## RESULTS OF WATER ANALYSIS FOR PRIORITY POLLUTANT BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/L)

	E & E Lab. No. 86-	8364	8365	8366	8367	8368
Compound	Sample Identity	9008	9009	9044	9045	9200
bis(2-chloroethyl)ether		<10	<10	<10	<10	<10
1,3-dichlorobenzene		<10	<10	<10	<10	<10
1,4-dichlorobenzene		<10	<10	<10	<10	<10
1,2-dichlorobenzene		<10	<10	<10	<10	<10
bis(2-chloroisopropyl)ether		<10	<10	<10	<10	<10
N-nitrosodipropylamine		<10	<10	<1U	<10	<10
hexachloroethane		<10	<10	<10	<10	<10
nitrobenzene		<10	<10	<10	<10	<111
isophorone		<10	<10	<10	<b>∫</b> <10	<10
bis(2-chloroethoxy)methane		<10	<10	<10	<10	<10
1,2,4-trichlorobenzene		<10	<10	<10	<10	<10
naphthalene		<10	<10	<10	<10	<10
hexachlorobutadiene		<10	<10	(10	<10	<10
hexachlorocyclopentadiene		<10	<10	<10	<10	<10
2-chloronaphthalene		<10	<10	<10	<10	\ <10
dimethyl phthalate		<10	<10	<10	<10	<b>KHI</b>
acenaphthylene		<10	<10	<10	<10	<10
fluorene		<10	<10	<10	<10	<10
acenaphthene		<10	<10	<10	<10	<b>K10</b>
2,4-dinitrotoluene		<10	<10	<10	<10	<10
2,6-dinitrotoluene		<10	<10	<10	<10	<10
diethylphthalate		<10	<10	<10	<10	<10
4-chlorophenyl phenyl ether		<10	<10	<10	<10	<10
N-nitrosodiphenylamine		<10	<10	<10	<10	<10
4-bromophenyl phenyl ether		<10	<10	<10	<10	<10
hexachlorobenzene		<10	<10	<b>K10</b>	<10	<10
phenanthrene		<10	<10	<10	<10	<10
anthracene		<10	<10	<10	<10	<10
di-n-butyl phthalate	i	13	15	14	13	12
fluoranthene		<10	<10	<10	<10	<10
benzidine	İ	<50	<50	<50	<50	<50
pyrene	1	<10	<10	<10	<10	<10
butyl benzyl phthalate	l	<10	<10	<10)	<10	<10
3,3'-dichlorobenzidine		<30	<30	<30	<30	<30
benzo(a)anthracene	İ	<10	<10	<10	<10	<10
bis(2-ethylhexyl)phthalate	İ	<10	<10	<10	<10	<10
chrysene		<10	<10	<10	<10	<10
di-n-octyl phthalate	1	<10	<10	<10	<10*	<10
benzo(b)fluoranthene		<10	<10	<10	<10	<10
benzo(k)fluoranthene		<10	<10	<10	<11)	<10
benzo(a)pyrene		<10	<10	<10	<10	<10)
indena(1,2,3-cd)pyrene		<10	<10	<10	<10	<10
dibenzo(a,h)anthracene	1	<10	<10	<10	<10	<10
benza(ghi)perylene		<10	<11)	<10	<10	<10
		```	,,,,			

<sup>\*</sup>Compound present below measurable detection limit.

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

## RESULTS OF WATER ANALYSIS FOR PRIDRITY PULLDIANT BASE/NEUTRAL EXTRACTABLE COMPOUNDS BY GC/MS

(all results in ug/L)

<u> </u>		_	_			
	E & E Lab. No. 86-	8369	Method Blank			
Compound	Sample Identity	9140				
bis(2-chloroethyl)ether		<10	<10			
1,3-dichlorobenzene		<10	<10	i		1
1,4-dichlorobenzene		<10	<10	İ		
1,2-dichlorobenzene		<10	<10			
bis(2-chloroisopropyl)ether		<10	<10	1	-	
N-nitrosodipropylamine		<10	<10	1	}	<b>\</b>
hexachloroethane		<10	<10	ļ		
nitrobenzene		<10	<10	J		1
isophorone		<10	<10	j		
bis(2-chloroethoxy)methane		<10	<10	[		
1,2,4-trichlorobenzene		<10	<10	ļ	1	1
naphthalene		<10	<10	j		
hexachlorobutadiene		<10	<10	-		
hexachlorocyclopentadiene		<10	<10	ļ	[	j
2-chloronaphthalene		<10	<10			
dimethyl phthalate		<10	<10	ļ	[	ļ
acenaphthylene		<10	<10		1	
fluorene		<10	<10		j	
acenaphthene		<10	<10	ľ	j	
2,4-dinitrotoluene		<10	<10	1	ļ.	
2,6-dinitrotoluene		<10	<10	İ		
diethylphthalate		<10	<10	1		İ
4-chlorophenyl phenyl ether		<10	<10	1	ļ	
N-nitrosodiphenylamine		<10	<10			
4-bromophenyl phonyl ether		<10	<10			
hexachlorobenzene		<10	<b>(</b> <10	[	[	1
phenanthrene		<10	<10	1		
anthracene		<10	<10	]		
di-n-butyl phthalate		13	11	)		
fluoranthene		<10	<10		ļ	
benzidine		<50	<50			]
pyrene		<10	<10	ĺ	i	
butyl benzyl phthalate		<10	<10	[		
3,3'-dichlorobenzidine		<30	<30	1	l	1
benzo(a)anthracene		<10	<10			ļ
bis(2-cthylhexyl)phthalate		<10	<10			1
chrysene		<10	<10		]	j !
di-n-octyl phthalate		<10	<10		!	]
benzo(b)fluoranthene		<10	<10			j į
benzo(k)fluoranthene		<10	<10			
benzo(a)pyrene		<10	<10			
indeno(1,2,3-cd)pyrene		<10	<10		ļ	
dibenzo(a,h)anthracene	]	<10	<10	}	1	]
benzo(ghi)perylene		<10	<11)			

<sup>\*</sup>Compound present below measurable detection limit.



## RESULIS OF WATER ANALYSIS FOR ORGANOPHOSPHOROUS PESTICIDES BY GC

(all results in ug/L)

	E & E Lab. No. 86-	Blank	8364	8365*	8366*	8367*	8368	
Campaund	Sample Identity	9/30/86	9008	9009	9044	9045	9200	
Naled		<0.10	<0.10	80.10	<0.10	<0.10	<0.10	
Phorate		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	
Disulfaton		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
Chlorpyrifos		<0.30	<0.30	<0.30	0.46	0.38	<0.30	
Dimethoate		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	
Malathion		<0.30	<0.30	0.30	<0.30	0.43	<0.30	
Mevinphos		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	
Parathion		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	
Methyl parathion		<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	
Diazinon		- <0.60	<0.60	<0.60	<0.60	<0.60	<0.60	
Methyl azinphos		<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	
<u> </u>								

<sup>\*</sup>Sample confirmed - results positive.



## ECULOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

## RESULTS OF WATER ANALSIS FOR PRIORITY POLLUTANT PESTICIDES, PCBs, AND HERBICIDES BY GC

(all results in ug/L)

	E & E Lab. No. 86-	Blank	8364	8365	8366	8367	8368	
Compound	Sample Identity	9/30/86	9008	9009	9044	9045	9200	
Aldrin	• · · · · · · · · · · · · · · · · · · ·	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
a-BHC		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
b-BHC		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
g-8HC		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
1-BHC		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Chlordan <del>e</del>		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
4,4'-DDD		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
4,4'-DDE		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
4,4'-DDT		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Dieldrin		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	_ <b>.</b> A
Endosulfan I		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Endosulfan II		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	*=
Endosulfin sulfate		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Endrin		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Endrin aldehyde		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
leptachlor		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Heptachlor epoxide		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
PCB - 1016		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
PCB - 1221		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
PCB - 1232		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
PCB - 1242		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
PCB - 1248	ļ	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
PCB - 1254	]	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
PCB - 1260	Ì	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Toxaphene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
2,4-D		<0.50	<0.50	<0.50	<0.5U	<0.50	<0.50	
2,4,5-TP (Silvex)	į	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
2,4,5-T		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	





## ECULOGY AND ENVIRONMENT'S, INC. ANALYTICAL SERVICES CENTER

### RESULTS OF WATER ANALYSIS FOR PHENOLS BY GC

(all results in ug/L)

	E & E Lab. No. 86-	Blank	8364	8365	8366	8 367
Compound	Sample Identity	10/1/86	9008	9009	9044	9045
phenol		<5.0	<5.0	<5.0	<5.0	<5 <b>.</b> 0
2-chlorophenol		<5.0	<5.0	<5.0	<5.0	<5.0
2-nitrophenol		<5.0	<5.0	<5.0	<5.0	<5.0
2,4-dimethylphenol		<5.0	<5.0	<5.0	<5.0	<5.0
2,4-dichlorophenol		<5.0	<5.0	<5.0	<5.0	<5.0
4-chloro-3-methylphenol		<5.0	<5.0	<5.0	<5.0	<5.0
2,4,6-trichlorophenol		<5.0	<5.0	<5.0	<5.0	<5.0
2,4-dinitrophenol		<13	<13	<13	<13	<13
4-nitrophenol		<5.0	<5.0	<5.0	<5.0	(5.0
4,6-dinitro-2-methylphenol		<16	<16	<16	<16	<16
pentachlorophenol		<7.4	<7.4	<7.4	<7.4	<7.4

<sup>\*</sup>Compound present below measurable detection limit.

## ECOLOGY AND ENVIRONMENT'S, INC. A N A L Y T I C A L S E R V I C E S C E N T E R

### RESULTS OF WATER ANALYSIS FOR PHENOLS BY GC

(all results in ug/L)

	E & E Lab. No. 86-	8368	8369			
Compound	Sample Identity	9200	9140			
pheno1		<5.0	<5 <b>.</b> 0			
2-chlorophenol		<5.0	<5.0			
2-nitrophenol		<5.0	<5.0		1	
2,4-dimethylphenol		<5.0	<5.0			
2,4-dichlorophenol		<5.0	<5.0			i
4-chloro-3-methylphenol		<5.0	<5.0			
2,4,6-trichlorophenol	(	<5.0	<5.0			
2,4-dinitrophenol		<13	<13			
4-nitrophenol		<5.0	<5.0		ĺ	
4,6-dinitro-2-methylphenol		<16	<16	Ĭ		
pentachlorophenol		<7.4	<7.4	ľ	i	

<sup>\*</sup>Compound present below measurable detection limit.



#### LABORATORY REPORT

FUR

#### REESE AIR FURCE BASE

U-4195.11

Job No.:	U-4195		RE: DF-2000			
Sample Date:	9/26/86		P.O. No.:			
Date Received:	9/27/86		Sampled B	ly: E&E	, Inc.	
Sample Type:	Water		Del ivered	By: Feder	al Express	
E & E Lab. No. 86-	8364	8365	8366	8367	8 368	8369
Customer No.	9008	9009	9044	9045	9200	9140
Sample Identity						
<del>-</del>	Results i	ln: mg∕L un	ng/L unless noted			
Total Dissolved Solids Oil and Grease Antimony Beryllium Cadmium Chromium Copper Lead Nickel Silver Thallium Zinc	190 1.2 <0.15 <0.01 <0.05 <0.02 <0.005 <0.1 <0.04 <0.20 <0.05	110 1.3 <0.15 <0.01 <0.05 <0.02 <0.005 <0.1 <0.04 <0.20 <0.05	310 1.7 <0.15 <0.01 <0.05 <0.02 0.007 <0.1 <0.04 <0.20 0.061	180 1.4 <0.15 <0.01 <0.05 <0.02 <0.005 <0.04 <0.20 <0.05	13 0.1 <0.15 <0.01 <0.05 0.049 <0.005 <0.1 <0.04 <0.20 <0.05	NR 3.4 <0.15 <0.01 <0.05 <0.02 0.03 <0.1 <0.04 <0.20 0.355

NR: Not requested.

Analytical References:

"Methods for the Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983.

H-443 Supervising Analyst: (16)





FUR

#### REESE AIR FORCE BASE

U-4195.12

	11 6405		RE:		-2000	
Jab No.:	U-4195		ne:		-2000	
Sample Date:	9/26/86		P.O. No.:			
Date Received:	9/27/86		Sampled B	ly: E	& E, Inc.	
Sample Type:	Water		Delivered	∣By: Fe	deral Express	
E & E Lab. No. 86-	8385	B) ank				
Customer No.	9140					
Sample Identity						
	Results i	in: mg/L ur	less noted			
Total Dissolved Solids Oil and Grease Antimony Beryllium Cadmium Chromium Copper Lead Nickel Silver Thallium Zinc	920 NR NR NR NR NR NR NR NR	NA NA (0.15 (0.01 (0.05 (0.02 (0.005 (0.1 (0.04 (0.20 (0.05				

NR: Not requested. NA: Not applicable.

Analytical References:

"Methods for the Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983.

H-444

Supervising Analyst: 2/10/16/2015

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#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

	E&E	(uç	(սց/L )		
Parameter	Laboratory No. 86- 8364	Original Analysis	Replicate Analysis	Percent Difference (RPD)	
chlorobenzene		<0.20	<0.20		
1,2-dichlorobenzene		<0.40	<0.40	}	
1,3-dichlorobenzene		<0.40	<0.40	}	
1,4-dichlorobenzene		<0.30	<0.30	}	
benzene		<0.20	<0.20	}	
total xylenes		<1.0	<1.0		
toluene		<0.20	<0.20		
ethyl benzene		<0.20	<0.20		

### QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED WATER SAMPLES

	E & E	Original Value	Amount Added	Amount Determined	
Compound	Laboratory No. 86-		(ug/L )		Percent Recovery
carbon tetrachloride	8369	<0.12	10.0	10.5	105
1,2-dichloroethane	8369	<0.03	10.0	12.5	125
1,1,1-trichloroethane	8369	<0.03	10.0	11.4	114
1,1-dichloroethane	8369	<0.07	10.0	11.2	112
chloroethane	8369	<0.52	10.0	11.5	115
chloroform	8369	<0.05	10.0	11.2	112
trans-1,2-dichloroethene	8369	<0.10	10.0	10.9	109
methylene chloride	8369	<0.25	10.0	14.2	142
chloromethane	8369	<0.08	10.0	13.6	136
bromomethane	8369	<1.18	10.0	15.3	153
bromoform	8369	<0.20	10.0	9.26	92.6
bromodichloromethane	8369	<0.10	10.0	10.6	106
trichloroethene	8369	<0.12	10.0	11.3	113

### QUALITY CONTROL FUR ACCURACY: PERCENT RECOVERY OF SURROGATE SPIKES

U-4195.20

	E&E	Amount Added	Amount Determined	
Compound	Laboratory No. 86-	(1.	ıg/L)	Percent Recovery
Nitrobenzene-D5	8364	100	56	56
	8365	100	57	57
	8366	100	54	54
	8367	100	62	62
	8368	100	56	56
	8369	100	67	67
2-Fluorabiphenyl	8364	100	55	55
	8365	100	58	58
	8366	100	57	57
	8367	100	63	63
	8368	100	64	64
	8369	100	66	66
Terphenyl-D14	8564	100	88	88
	8365	100	69	69
	8366	100	63	63
	8367	100	81	81
	8368	100	84	84
	8369	100	66	66

These recoveries are acceptable to EPA Contract Lab Program (CLP) guidelines.



## QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY OF SURROGATE SPIKES

U-4195.21

	E & E	Amount Added	Amount Determined	
Compound	Laboratory No. 86-	(u	ıg/L)	Percent Recovery
Pheno1-D5	8364 8365 8366 8367 8368 8369	200 200 200 200 200 200 200	52 52 50 45 48 50	26 26 25 22.5 22.5 24 25
2-f luoraphenol	8364 8365 8366 8367 8368 8369	200 200 200 200 200 200 200	84 108 108 88 110 86	42 54 54 44 55 43
2,4,6-Tribromophenol	8364 8365 8366 8367 8368 8369	200 200 200 200 200 200 200	119 147 156 144 128 123	59.5 73.5 78 72 64 61.5

These recoveries are acceptable to EPA Contract Lab Program (CLP) guidelines.





## QUALITY CONTROL FOR ACCURACY: PERCENT RECUVERY FOR SPIKED WATER SAMPLES

	E & E Laboratory	Original Value	Amount Added	Amount Determined	
Parameter	Nu. 86- DI Spike		(ug/L)		Percent Recovery
2,4,6-trichlorophenal		<5.0	40	25	63
4-chloro-3-methylphenol		<5.0	40	23	58
2-chlorophenol		<5.0	40	20	50
2,4-dimethylphenol		<5.0	40	23	58
2,4-dichlorophenol		<5.0	40	21	53
2-nitrophenol		<5.0	40	25	63
4-nitrophenol		<5.0	40	12	3u
4,6-dinitro-2- methylphenol		<16	40	22	55
pentachlorophenol		<7.4	40	16	40
pheno1		<5.0	40	6.6	16
		li			
		n			

### QUALITY CONTROL FOR ACCURACY: PERCENT RECOVERY FOR SPIKED WATER SAMPLES

	E & E Laboratory	Original Value	Amount Added	Amount Determined	
Parameter	Laboratory No. 86- DI Spike		(ug/L)	)	Percent Recovery
2,4-0		<0.50	10.0	8.8	មម
Silvex (2,4,5-TP)		<0.05	10.0	7.6	76
			<u> </u>		
			)   		
	i				
	: ; 		) 		

#### QUALITY CONTROL FUR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

	E & E Laboratory No. 86-	(ug/ Original	L) Replicate	Relative Percent Difference
Parameter	8365	Analysis	Anelysis	(RPD)
Aldrin		<0.05	<0.05	
a-BHC		<0.05	<0.05	
b-BHC		<0.05	<0.05	
g-BHC		<0.05	<0.05	
d BHC		<0.05	<0.05	
Chlordane		<0.50	<0.50	
4,4'-000		<0.10	<0.10	
4,4'-DDE		<0.10	<0.10	
Dieldrin		<0.10	<0.10	
Endosulfan 1		<0.05	<0.05	
Endosulfan II	:	<0.10	<0.10	
Endosulfan sulfate		<0.10	<0.10	
Endrin		<0.10	<0.10	
Endrin aldehyde		<0.10	<0.10	
Heptachlor		<0.05	<0.05	
Heptchlor epoxide		<0.05	<0.05	<b>-</b> -
PCB - 1016		<0.50	<0.50	
PCB - 1221		<0.50	<0.50	
PCB - 1232		<0.50	<0.50	
PCB - 1242		<0.50	<0.50	
PCB - 1248		<0.50	<0.50	
PCB - 1254		<1.0	<1.0	
PCB - 1260		<1.0	<1.0	<del>-</del> -
Toxaphene		<1.0	<1.0	



	QUALITY CONTROL RESULTS OF ANALYS ANALYSES OF WA	FOR PRECISION IS OF REPLICA ATER SAMPLES	A L E	
				U-4195
	E & E	(ug,	۱)	Relative
Parameter	Laboratory No. 86- 8365	Original Analysis	Replicate Analysis	Percent Differenc (RPD)
Naled		<0.10	<0.10	
Phorate		<0.15	<0.15	
Disulfoton		<0.20	<0.20	
Chlorpyrifos		<0.30	<0.30	
Dimethoate	·	<0.30	<0.30	
Malathion		0.30	0.85	96
Mevinphos		<0.30	<0.30	
Parathion		<0.30	<0.30	
Methyl parathion		<0.30	<0.30	
Diazinon		<0.60	<0.60	
Methyl azinphos		<1.5	<1.5	
		<del>-</del>	························	
	H <b>-4</b> 52			

#### QUALITY CONTROL FOR PRECISION RESULTS OF ANALYSIS OF REPLICATE ANALYSES OF WATER SAMPLES

		(mg/	L)	Relative
Parameter	E & E Laboratory No. 86-		Replicate Analysis	Percent Difference (RPD)
Cadmium	8369	<0.01	<0.01	
Chromium	8369	<0.05	<0.05	
Copper	8369	<0.02	<0.02	
Lead	8369	0.030	0.030	o
Nickel	8369	<0.1	<0.1	
Thallium	8369	<0.20	<0.20	
Zine	8369	0.355	0.347	2.3

## QUALITY CONTROL FOR ACCURACY: PERCENT DIFFERENCE--EPA QUALITY ASSURANCE MATERIALS

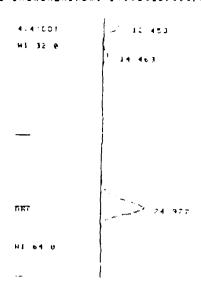
	Concentrat	tions in ug/L	
Parameter	Known	Determined	Percent Difference
Arsenic Cadmium Chromium Copper Lead Mercury Nickel Zinc Total Dissolved Solids Oil and Grease	20.0 940 1030 1030 17.0 4.4 1020 1010 320 22,600	19.5 931 998 1002 17.3 4.46 997 997 340 16,400	2.5 1.0 3.1 2.7 1.8 1.4 2.2 1.3 6.2 27.4



CHROMATOGRAPHIC CONDITIONS

Operator	Date		
Job Number	Sample Identification		
Solvent <u>Hexane</u>	Analytical Method SW8080		
Instrument Varian 6000 #2A	Pesticides		
COLUMN	CHART SPEED, cm/min. 0.5		
Type <u>Glass</u>	DETECTOR <u>Electron</u> Capture		
Length 6'	Range 10		
Diameter 4mm ID			
Liquid Phase (% wt.) 3% OV-1	Attenuation 64		
Support Supelcoport	TEMPERATURE, °C		
Mesh 100/120	Detector 300		
	Injection Port220		
CARRIER GAS <u>Nitrogen</u>	Column		
Rotameter NA	Initial 200 Isothe wal		
Inlet Pressure, psig <u>60</u>			
Flow Rate, mL/min. 60	Program NA		
	Final NA		

CHART SPEED 0.5 CM/MIN ATTEN: L4 ZERO: 10% 5 MIN/TICK will on it on or organi-41 DE 111 5 3.2 HEPT EPUM #1-ENDU #1-16-0 #1-15-00E ~ e e54 ENDER-END FTUED ARRE FUNG SO4 4.41001 ит 32 в 14.463 तका H1 - G4 0 CHART SPEED 0.5 CM/MIN ZERO: 10% 5 MIN/TICK ATTEN: 64 HI O OZII ONZII OFF 51 385 В-В<del>-</del>ВнВ-внс HEFTACHLO ALDRIN HEPT EPOX N-ENDU NI-16 0 DIEL2006 0 051 END&B-END 6 720 - 11 223 **EHDB S04** S 12 453 4.4'007 HI 32 @ 14 463 H-457 181



11:04 11 JUL DU

SAMPLE: 4 158-1	וט אנו	HOD: CONFA		CALCULATIO	M: F?	CULTR
PENK PENK	RESULT	LIME	LIML	OKE O	SEP	W172
NO NAME	FACTOR	(MIM)	UEFSET	COUNTS	LUUL	(SEC)
ţ		1.285		351408	υV	5.44
£'		1.429		ئازاراناد ئازاراناد	VB	2.25
3 A-BHC	ט ווטטטט. ט	1.955	- 0.005	12400319	ВV	7 5.19
4 B-BHC	טבווטטט.ט	2.006	ს.ს16	1785372	ÜÜ	7 5.50
5 6,D-BHC	U . UUUU I YU	2.305	- 0 . 005	21284858	บบ	y. 00
ថ		2.989		60715	BB	b. 94
7 HEPTALHLU	<b>0. הממממי</b> מ	J.595	0.015	3444527	UU	6.94
R WEAKIM	W.UUUU44U	4.430	<b>0.000</b>	4539230	มม	υ. i ο
A HELL FLOX	<b>0</b> .000054U	5.572	บ.บ.บ	3702162	ЫV	11.25
10 V-FNDA	<b>0.000063</b> U	ნ. ს54	0.046	3160462	VII.	14,44
11 DIFFROOF	<b>0.000050</b> U	7.711	0.059	7960544	BV	15.58
IS TUDER END	<b>0.0000/4U</b>	8.720	0.070	5400510	υv	24,19
13 E.ALD/000	<b>0.0000</b> 0330	9.643	0.007	4311455	ΰű	27.75
14 LNU0 504	<b>0.0000820</b>	11.223	0.1.7	1431178	VV	رادا . در رادا . در
15 4,4'001	U.000163U	12.453	0.147	1185315	VE	
16		14.463	• • • • •	30,1185	88	<sup>2</sup> 35.81
17 DBC	0.0001920	24.977	0.273	5221097	88	35.19
			w.E.75	3221031	υņ	68.50
TOTALS:			- <b>0</b> .856	8003.6527		

BETECTED PKS: 19 REJECTED PKS: 2

AMI 510: 1.00000

NOISE: 182.8 OFFSET: -12

NUTES:
NUTEBOOK:230 93 NNALYST: K.JUREK
SECURE AREA:U JOB#: U 3615
INST. VARIAN 5000#2 A ECU TOXI ATT:G4
COLOMN: 5' OLASS 4MM ID 100/120 SUPELCOPORT
LIQUID PHASE:3% UU-T
CARRIER GAS: N2 0 50 ML/MIN.
DET:300 C INJ://20 U
200 C 150IHERMAL 4 UL INJECTION

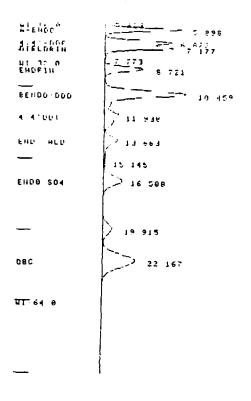
POST RUN: SAVE FIFE: RAW

CUTES

R			

Operator	Date			
Job Number				
Solvent Hexane				
Instrument Varian 6000 #28	Pesticides			
COLUMN	CHART SPEED, cm/min. 0.5			
Type <u>Glass</u> Length <u>6'</u> Diameter <u>4mm ID</u>	Range 10			
Liquid Phase (% wt.) <u>1.5% SP2250 1.99</u> Support Supelcoport  Mesh <u>100/120</u>	5% SP2401			
CARRIER GAS <u>Nitrogen</u> Rotameter <u>NA</u> Inlet Pressure, psig <u>80</u> Flow Rate, mL/min. <u>60</u>	Program NA			

CHART SPEED U.5 CM/MIN ZERO: 10% 5 MIN/TICK ATTEN: 16 STAT INJECT HEET FROM HIEHBO" BIELORTA HI 32 0 ENDRIN BENDO/000 4 . 4 ' DDT 11 938 END9 504 19 915 DDC 22 167 HT 64 8 CHART SPEED 0.5 CM/MIN ZERO: 10% 5 MIN/TICK MI U ONTI OUNTI 4 063 HERT EPOX MIENDO. dieLorin HI 32 0 EHDRIH BEH00-000 4 - 4 1001 ENU ALD 15 145 ≥ 16 50R EHD0 304 H-460



CHANNEL: 1B - 1 IIILE: RUN# 2

10:16 **9 JUL 86** 

L'activité de

22.22.22

22-22-22

SAMPLE: 4-158-10 METHOD: CONFB CALCULATION: ES - CALIB PEAK PEAK RESULT LIME LIME AREA SEP W1/2 NU NAME FACTOR (MIN) OFFSET COUNTS CODE (SEC) I A-BHC 0.0002550 1.690 0.000 784744 BU4.44 2 G-BHC USOFOOD. A 2.115 0.005 650168 VV 5.63 3 HEPTACHLU 0.0007720 2.408 -0.002 258942 VΨ 7.06 4 U-BHC 0.0004730 2.605 0.005 422508 UΩ 1.44 5 B-8HC 0.000341U 2.805 0.005 586603 ŲŲ 7.75 6 ALURIN **0.0003050** 3.152 0.002 655517 Ų₽. 8.63 7 HEPT EPOX U.000331U 4.683 -0.007 605089 12.88 8 A-FNDO 0.0003550 5.898 **0.008** 563309 υū 16.19 9 4,4'-UUE U.000361U 6.822 -0.008 553493 VΨ 7 19.94 10 DIELURIN 0.000336U 7.177 -0.013 595009 7 24.56 Uυ 11 ENURIN 0.0005050 8.721 0.001 395922 VV 22.94 12 BENDO/000 0.0003330 10.459 -0.021 11,99939 Vυ دًط.0د 13 4.4'001 **0.0006620** 11.938 -0.022 302184 νu 57.13 14 ENU. ALU. 0.000841U 13.663 -0.027 237939 VV 38.0b 15 ENOO. Seg @ 16.51 15,145 32565 7 53.38 VU 16 19.915 212037 ВV 54.05 17 DBC 0.0010790 22.167 -0.045 926929 VB. 62.31 101ALS: -0.117 8982916

REJECTED PKS:

AMI SIU: 1.00000

DETECTED PKS:

NOISE: 34.3 OFFSET:

25

NOTES:

COSTRACTOR DE L'ACOURT DE L'ANNAIGNE DE L'ANNAIGNE DE L'ACOURT DE L'ACOURT DE L'ACOURT DE L'ACOURT DE L'ACOURT

NOTEBOOK:230-90 ANALYST: K.JUREK SECURE AREA:U JUBR 4-36/5-INST: VARIAN 6000#2 8 ECU 10X1 ATT:16 COLUMN: 6° GLASS 4MM ID 1007/120 SUPELCOPORT PHASE: 1.5% SP2250/1.95% SP2401 CARRIER GAS: N2 8 50 ML/MIN. DE1:300 C INJ:220 C

200 C ISOTHERMAL 4 UL INJECTION

H-461

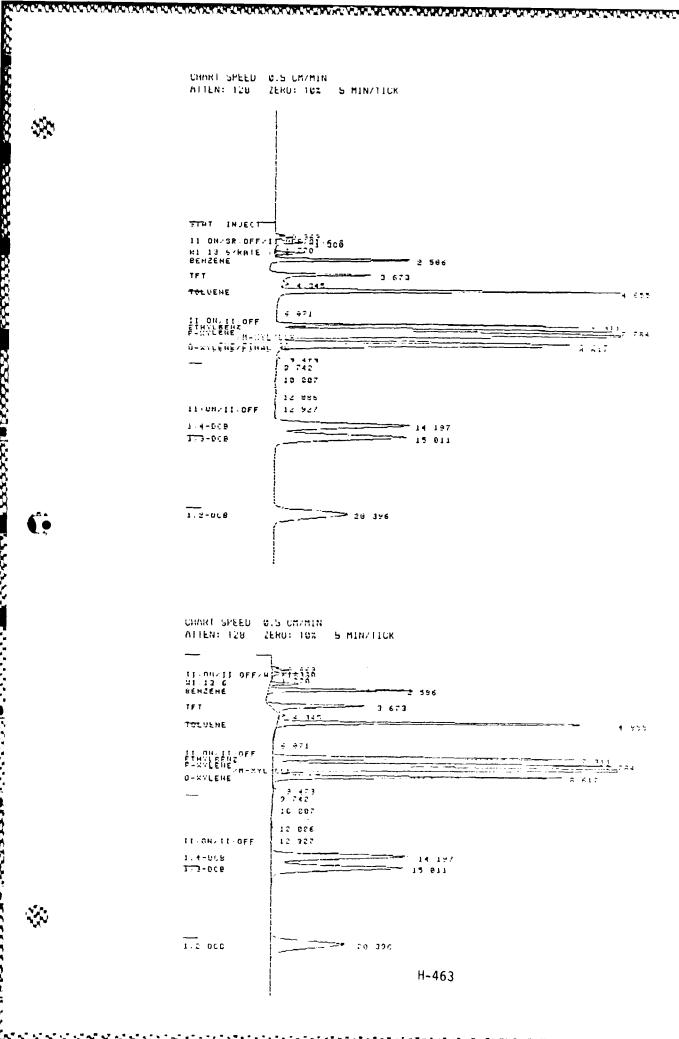
PUST RUN:

SAUE FILE: HAW

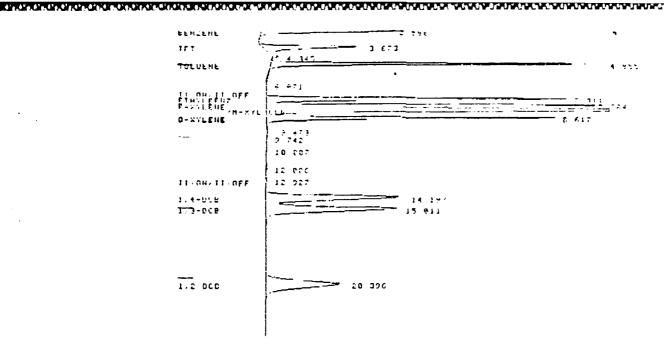
238082

## ecology and environment, inc. A N A L Y T I C A L S E R V I C E S C E N T E R CHRUMATOGRAPHIC CONDITIONS

Connection	Data
Operator	Date
Job Number	Sample Identification
Solvent NA	Analytical Method EPA 602
Instrument Varian 6000 #3	
<del></del>	
COLUMN	CHART SPEED, cm/min. 0.5
TypeStainless Steel	NETERIOR DESCRIPTION AND AND AND AND AND AND AND AND AND AN
Length 6'	DETECTOR Photometric Ionization(Tracor
Diameter 1/8"	-12 Range <u>10</u>
Liquid Phase (% wt.) 5% SP1200 1.75%	Attenuation 128
Bentone-34	•
Support Supelcoport	TEMPERATURE, °C
Mesh 100/120	Detector 300
	Injection Port 220
CARRIER GAS <u>Nitrogen</u>	Column
Rotameter NA	Initial 50 2 min.
Inlet Pressure, psig 60	Program 6/min.
Flow Rate, mL/min. 40	Final 90
	PURGE AND TRAP
	Purge time <u>12 min.</u> Temp. <u>30</u>
	Purge flow 40ml/min.
	Desorb time 4 min. Temp. 180
	Bake time <u>15 min.</u> Temp. <u>200</u>



Parados Parados electros essessos estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados estados esta



## Continuing RT + Cal Click OK

CHANNEL: 3A - 1 TITLE: RUN: // 15:55 30 JUN 66

Allet 5009
SAMPLE: 5-158-62 METHOD: PURARO CALCULATION: E5 - ANALYS

•							
PEA	K PEAK	RESULT	LIME	IIME	AKEA	5611	W172
NO	NAME	with Ng	(MIN)	UFFSET	COUNTS	CODF	(SEU)
1		ຜ. ບບບບັ	1.380		63502	BB	5 . სს
2		0.0000	2.130		98766	Ü₩	7.01
3	RENTEME	54.2760	2 . 586	-0.004	452546	VU	7.01
4	161	34.6020	3.673	-0.057	396647	ыu	10.04
وا		છે. ૭૭૭૭	4.345		22298	VV	كانا، والا
£	TULUENE	49.6718	4.655	-0.025	1181133	VΨ	9.56
7	ETHYLBENZ	49.9130	7.311	-0.009	1092438	BV	5.54
A	P-XYLENE	49.9268	7.784	-0.006	1214070	VV	10.00
'n	M-XYL/CLB	100.9997	8.067	-8.813	2825019	UU	18.66
10	U-XYLENE	50.5219	8.617	-0.003	1114823	VV	10.06
11		0.0000	9.473		13071	}	باد ، ن ۱
12		0.0000	9.742		2812	}	7 47.25
13		0.0000	10.807		2225	धध	11.69
14		0.0000	12.006		9127	Ŀы	7 21.66
15	1.4-DCB	50.4527	14.197	-0.003	1030532	ÐV	7 21.25
16	1.3-DCB	50.4830	15.011	-0.009	1112465	VĽ	7 23.50
17	1.2-00B	50.4174	20.396	9.006	886027	បម	7 33.94

TOTALS: 541,2243 -0.123 11519901

UETECTED PKS: 23 REJECTED PKS: 6

DIVISOR: 1.00000 MULTIPLIER: 1.00000

NOISE: \$4.9 OFFSET: 41

NOTES:
NOTEBOOK:232-35 ANALYSTIK, JUREK
SECURE AREA:E JOUR U- 36/6
INST:VARIAN 8000#3 PID 10-12 AITN:128
COLUMN:6' SS 178" OD 100/120 SUPELCOPORT
PHASE:S% SP1200/175% BENTONE-34
CARRIER 6AS: N2 # 40 ML/MIN.
DET: 300 C 1N1:220 C
INIT 500 HOLD 2MIN 10 900 GMIN

POST RUN:

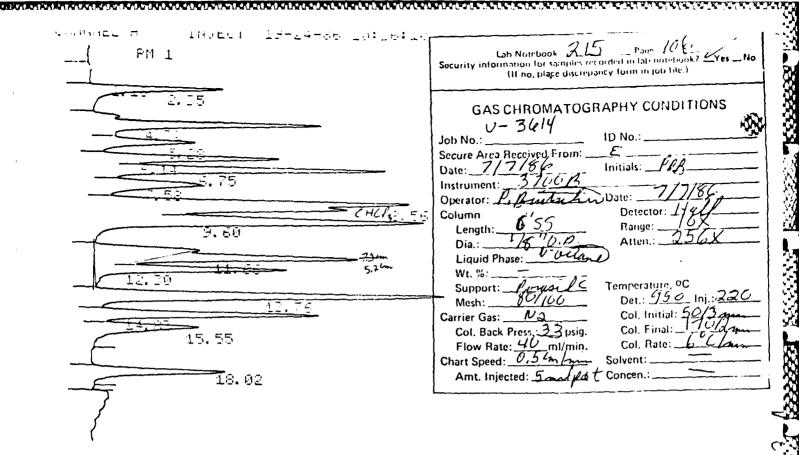
SAUE FILE: KAW

F 10600

Re	e	se		4
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Operator	Date				
Job Number					
Solvent NA	Analytical Method EPA601/SW8010				
Instrument Varian 3700					
<del></del>					
COLUMN	CHART SPEED, cm/min. 0.5				
Type Stainless Steel	DETECTOR Hall Electrolytic Conductivit				
Length 6' Diameter 1/8" OD Liquid Phase (% wt.) N-Octane	Range 10 Attenuation 256				
Support	TEMPERATURE, °C  Detector 950				
CARRIER GAS Nitrogen  Rotameter NA  Inlet Pressure, psig 60  Flow Rate, mL/min. 40	Injection Port 220  Column  Initial 50 3 min.  Program 6/min.  Final 170				
Mode Halogen  Solvent 1-Propanol  Solvent flow, mL/min. 0.5  Reactor tube temperature, °C 950  Reactor gas Hydrogen  Reactor gas flow, mL/min. 50	PURGE AND TRAP  Purge time 11 min. Temp. 30  Purge flow 40 ml/min.  Desorb time 4 min. Temp. 180  Bake time 15 min. Temp. 220				





1-158-64

FILE 1.

19-24-86 10:36:10 CH= "A" FS=

RUN 55 INDEX 54

ANALYST: P BRUTSCHER

METHOD

Ñ.

PEAK# **AREAX** RT AREA BO 1 9.152 1.18 88339 02 23 3.663 2.35 2129669 02 7.143 4.32 4152672 02 4 5.28 3.282 1907916 02 5 5.023 6.14 2920196 02 6 6.75 8.063 4687145 02 4.562 7.58 2651949 02 8 14.997 8.56 8718168 02 9 13.66 9.6 7940946 08 19 11.66 10.578 6149248 06 11 5.244 12.3 3048374 06 12 13.76 6270592 06 10.786 13 5.644 14.83 3281298 06 3.56 14 15.55 2069549 07 3.643 15 18.02 2117983 01

TOTAL 100. 58134044

FE= 1. FI = 1. 11년= 년. PRESS TENTER? TO SKIP ENTRY FILE MAME :" BLANK TIME FUNCTION VALUE TT= +.A FAULT - 100: AT 9110

CHANNEL A INJECT 19-24-86 11:14:57

H-466

FM 1

Re		_	<

### ecology and environment, inc. A N A L Y T I C A L $\,$ S E R V I C E S $\,$ C E N T E R

CHROMATOGRAPHIC CONDITIONS

Operator	Date			
Job Number	Sample Identification			
Solvent NA				
InstrumentVarian 6000 #28	Herbicides Column			
COLUMN	CHART SPEED, cm/min. 1.0			
TypeGlass				
Length 6'	DETECTOR ECD			
Diameter 4 mm ID	Range 10 x 1			
Liquid Phase (% wt.) 1.5% SP2250/	Attenuation 16			
1.95% SP2401	TEMPERATURE, °C			
Support Supelcoport	Detector 300			
Mesh 100/120	Injection Port 220			
	Column			
CARRIER GAS N2	Initial 185 Isothermal			
Rotameter NA	Program			
Inlet Pressure, psig 60				
Flow Rate, mL/min. 60	Finel			

238082

many and payer

ATTEN: 16 JEPS: 18% 1 MIN. 11CH etter. 11 OH- SP OFF 11 2 - 4 - OHE \*14.057 HI 12 2 2.4.5-THE CHART SPEED 1.0 CM/MIN ATTEN: 16 ZERO: 10% | HIN/TICK 9 532 1 9 8 3 5 11-0H/11-0FF 2 . 4 - DME SELVEX NI:12 2 2.4.5-THE CHANNEL: 18 - 1 TITLE: RUN# 2 17:09 8 AUG 86 SAMPLE: 2-158-2 METHOD: HERB CALCULATION: ES - CALIB PEAK PEAK RESULT TIME TIME AREA SEP NO NAME (MIN) FACTOR OF F 5E 1 COUNTS CODE (SEC) 1 2.4-DME 0.0037050 2.190 0.010 539757 ĦV 12.75 Z SILVEX 0.0006090 2.889 -0.002 657323 υv 7 12.06 3 2,4,5-TME 0.000602U 3.576 0.016 810184 VV 15.88 TOTALS: 0.024 2007264 DETECTED PKS: REJECTED PKS: 5 AMT STD: 1.00000 NOISE: 34.3 OFFSET: NOTES: NOTEBOOK: 230-131 ANALST: RICHARD SAMSON SECURE AREA:D JOB: 3825, 3826, 37F8
INST. VARIAN 6000:28 ECD 10X1 ATT:16
COLUMN:6' GLASS 4MM ID 100/120 SUPELCOPORT LIQUID PHASE: 1.5% SP2250/1.95% SP2401 CARRIER GAS: N2 @ 60 ML/MIN. DET: 300 C INJ: 220 C 185 C ISOTHERMAL 4 UL INJECTION POST RUN: SAVE FILE: RAW HERBIEIIS CHAPT SPEED 1.0 CM/MIN ATTEN: 16 ZERO: 10% 1 MIN/TICK STAT INJECT 9 510 ( 6F#832 11-OHZSR OFFZE H-468

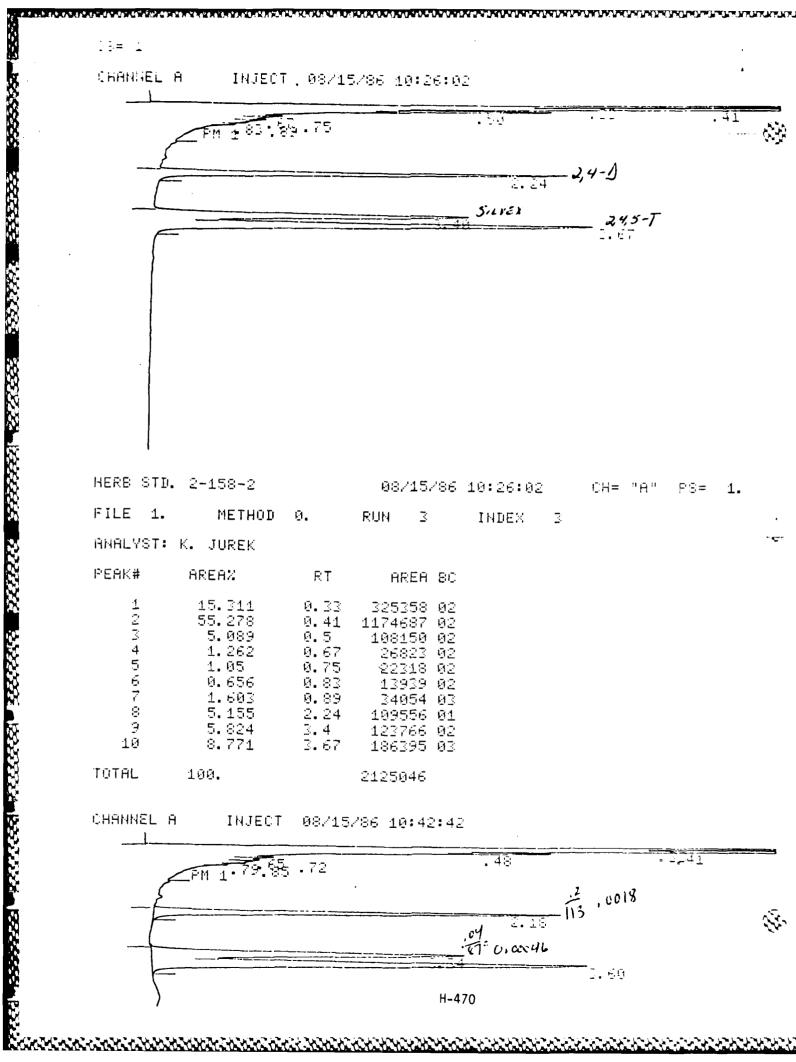
H-46

2 109

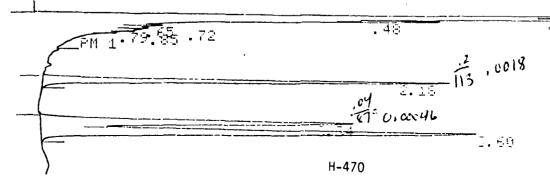
2 . 4 - DHE

R	P	P	9	۵	_	4

Operator	Date		
Job Number	Sample Identification  Analytical Method SW8150  Herbicides Column		
Solvent			
Instrument Varian 6000 #2B			
COLUMN	CHART SPEED, cm/min. 1.0		
Type Glass	DETECTORECD		
Length 6'			
Diameter 4 mm ID	Renge 10 x 1		
Liquid Phase (% wt.) 3% 0V-1	Attenuation 16		
Support Supelcoport	TEMPERATURE, °C		
Mesh100/120	Detector 300		
-	Injection Port 220		
CARRIER GAS N2	Column		
Rotameter NA	Initial 175_Isothermal		
Inlet Pressure, psig 60	Program		
Flow Rate, mL/min. 60	Final		



PEAK#	AREA%	RT	AREA	80
1234567899 10	15.311 55.278 5.089 1.262 1.05 0.656 1.603 5.155 5.824 8.771	0.33 0.41 0.57 0.67 0.83 0.83 2.4 3.67	325358 1174687 108150 26823 22318 13939 34954 109556 123766 186395	02 02 02 02 02 03 01 02
TOTAL	100.		949594 <i>€</i>	



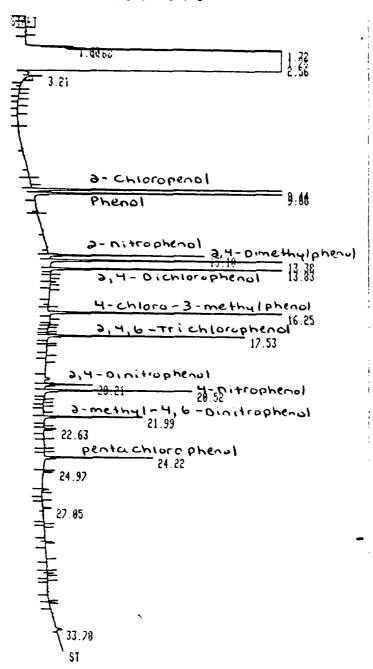


Operator	Date		
Job Number	Sample Identification		
Solvent	Analytical Method		
Instrument Varian 6000A #1	Organophos		
COLUMN	FID GAS		
Type FCSS	Hydrogen, ml/min		
Length 20m	Air, ml/min.	<del>,</del>	
Diameter 0.25 mm	CHART SPEED, cm/min.		
Liquid Phase (% wt.) 0.25 DB-1  Support FSCC  Mesh	DETECTOR FPD -10		
CARRIER GAS N2	Attenuation 8		
Rotameter NA	TEMPERATURE, °C		
Inlet Pressure, psig	Detector 300		
Flow Rate, mL/min. 2			
ModeSolvent flow, mL/min	Column Initial 100/2 m Program 8°/min. Final 220		
Reactor tube temperature, °C	PURGE AND TRAP		
Reactor gas	Purge time	Temp.	
Reactor gas flow, mL/min.	Purge flow		
	Desorb time		
	Bake time		



```
PRESS PENTER TO SKIP ENTRY
 FILE NAME=" +3-158-66
  TIME
              FUNCTION VALUE
  TT= +. A
                 FAULT
                           100: AT 9110
 CHANNEL A
                  INJECT 08/14/86 18:10:46
   <u> 28</u> - 89
   MEVINANDS
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  PHURATE
  -DIMETHUATE
   DISLLFOTON
  B. SE DIAZINON SIMM
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  Secure Area Medaired From
  Dele: 8-14-86
  CANTAN GOVOA #1
  Operator: Buding Managembate:
  Column
  10-10
  20M
  Length: ___
   U.35 M
  Dia.: _
  Liquid Phase: DB-/-
Wt. %: 0.25 nm TALL
  Telphoralurg OC
  Support:
  1.1. 300 Mi 250_
  Mesh:
3-158-66
                                   68/14/86 1 Godler Got: 1/21H= "H" CATIBED 4 10051 21mm
  Confident
  Col. Back Press.: ____p. +
   2208
FILE 1.
                METHOD @.
                                  RUN
   I Flow Rate: 52 ml/min. 1 Rate: _
   (a) 8°chum
  Chart Speed: 0, Scal far C 100011
ANALYST: RICHARD SAMSON
  Amt. L.
PEAK#
            AREA%
                            RT
                                     AREA BO
                      woj/med
             90.05
                           0.19 11056006 03
     2 METINPHOS 1. 888 9.61 2.22
                                   123791 9195mm 0.161
               0.235
                          4. 8
                                   28804 02
               0.798
                           5.38
                                    97986 02
     50 IMETHUATE 1. 566 9.50 5.56
                                   192327 03 Domm 0.079
96502 02
               0.786 6.86
     7 PAZINON 0. 732 6.27 7.09
                                    89818 028/MM 0.065
              1.275
     8
                          7.7
                                   156544 03
     3P+M+C 2.93 19.93 9.84
                                   3,59716 01 5.5%
    10
              0.621 14.42
                                    76270 01
TOTAL
       100.
                                12277674
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                                    9110
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Operator	Date		
Job Number			
Solvent	Analytical Method		
Instrument <u>HP5890A</u>	Pheno1		
COLUMN	FID GAS		
Type <u>Capillary</u>	Hydrogen, ml/min30		
Length 30m	Air, ml/min400		
Diameter 0.32 mm	CHART SPEED, cm/min0.5		
Liquid Phase (% wt.) 0.25 DB-5  Support FSCC	DETECTOR FID		
Mesh	Range 2		
CARRIER GAS He	Attenuation 2		
Rotameter	TEMPERATURE, °C		
Inlet Pressure, psig	Detector 300		
Flow Rate, mL/min. 1.5	Injection Port 250		
HALL DETECTOR	Column Initial <u>50/4 min.</u>		
Mode	Program 8°/min.		
SolventSolvent flow, mL/min	Final <u>300</u>		
Reactor tube temperature, °C	PURGE AND TRAP		
Reactor gas	Purge time Temp		
Reactor gas flow, mt/min.	Purge flow		
	Desorb time Temp.		
	Bake timeTemp		



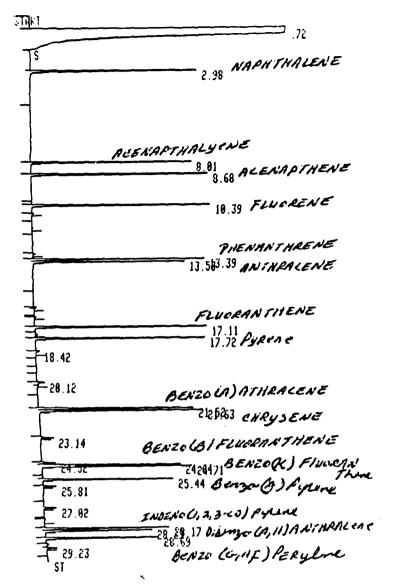
RUN # AUG/29/86 10:27:25 WORKFILE ID: C WORKFILE NAME: ID: 2-158-68 PHENCL STA AREA% RT AREA TYPE AR/HT AREA% 1.60 10049 D PY 0.0280.004 21778 ٧V 0.009 1.68 0.048 1.72 64351 D VH 0.021 0.028 1.78 2.2053E+08 1SHH 94.339 0.438 2.56 1.2419E+97 SHB 5.313 0.100 3.21 11634 ٧B 0.022 0.005 9.44 121050 PB 8.039 0.052 3.66 87683 F.B 0.040 0 938 13.19 41146 0.035 PB 0.018 13.38 121550 PB 0.0360.052 13,83 69586 F.B 0.037 0.030

H-474

SSSSSSS CLEANER DEELLE SSSSSSS

Operator	Date			
Job Number	Sample Identification			
Solvent	Analytical Method			
Instrument <u>HP5890A</u>				
COLUMN	FID GAS			
Type FSCC	Hydrogen, ml/min. 30			
Length 30m	Air, ml/min400			
Diameter 0.32	CHART SPEED, cm/min. 0.5			
Liquid Phase (% wt.) 0.25 DB-5 Support FSCC	DETECTOR FID			
Mesh	Range 3			
CARRIER GAS N2	Attenuation 4			
Rotameter	TEMPERATURE, *C			
Inlet Pressure, psig 60	Detector 300			
Flow Rate, mL/min. 1.5	Injection Port 300			
HALL DETECTOR	Column Initial <u>100°C 4 min.</u>			
Mode	Program 8°C/min.			
SolventSolvent flow, mL/min	Final 310°C			
Reactor tube temperature, °C	PURGE AND TRAP			
Reactor gas	Purge time Temp.	•		
Reactor gas flow, mL/min.	Purge flow			
	Desorb time Temp.			
	Bake time Temp			

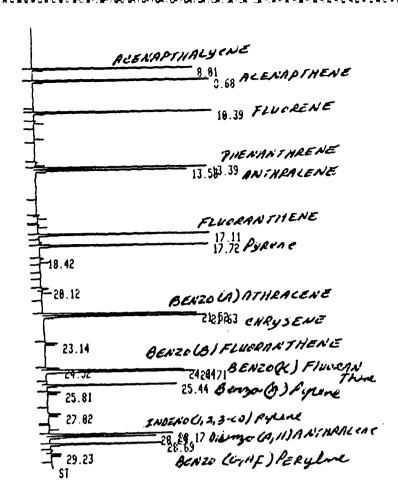




RUN # 11 AUG/13/86 10:09:57
WORKFILE ID: C
WORKFILE NAME:
ID: 1-158-66 PAN SEE 10:49/ml

AREA%				ADEAN.
RT	area	TYPE	AR/HT	AREA%
0.72	9.2632E+97	1SPB	0.184	96,615
2.98	213730	PB	0.043	0.223
8.01	215520	PB	0.044	0.225
3.68	239449	PB	0.043	0.249
10.39	224590	PB	0.042	0.234
13.39	212490	P٧	0.041	0,222
13.53	187449	٧B	0.041	0.196
17.11	683113	PB	0.041	0.220
17.72	210740	PB	0.041	0.220
20.12	11842	PP	0.054	0,012
21.52	200180	P۷	0.043	0,209
21.63	218910	٧B	Ø. 044	0,228
23.14	12932	FΒ	9.948	0.019
24.52	19232	FP	9.047	0.020
24 64	187730	PΑ	0.045	0.136

H-476



RUN # 11 AUG/13/86 10:09:57
WORKFILE ID: C
WORKFILE NAME:
ID: 1-158-66 PAH SEE 10:49/ml

AREA%				
RT	AREA	TYPE	AR/HT	AREA%
0.72	9.2632E+07	<b>TSPB</b>	0.184	96.615
2.98	213730	PB	0.043	0.223
8.01	215520	PB	0.044	<b>0</b> .225
3.68	239449	PB	0.043	0.240
10.39	224598	PB	0.042	0.234
13.39	212490	PY	0.941	0.222
13.53	137440	VB	9.041	0,196
17.11	511580	РB	0.041	0.220
17.72	210740	•	0.041	0.220
20.12	11842	. –	0.054	9,912
21.52	200180		0.043	0.209
21.63	218910	• -	0.044	0.228
23.14	17932		0.048	0.019
24.52	19232		0.047	0.020
24.64	187798		0.045	0.196
24.71	188360	• •	0.042	0.197
25.44	170780		0.044	0.178
25.81	19854		0.049	0.021
27.92	19555		0.052	9,929
28.17	173016		9,046	0.181
28.29	142850		0.044	0.149
28.69			9.945	0.160
29.23			0.050	0.016
LJ.LJ				

TOTAL AREA= 9.5877E+07 MUL FACTOR= 1.0000E+00 %%**\_%%%%\_%%%%** 

# ecology and environment, inc. A N A L Y T I C A L S E R V I C E S C E N T E R CHROMATOGRAPHIC CONDITIONS

Operator	Date	
Job Number	Sample Identification	
Solvent	Analytical Method 808	0
Instrument Varian 3700B	Pesticides	
COLUMN	FID GAS	
Type <u>Class</u>	Hydrogen, ml/min.	
Length 6'	Air, ml/min.	
Diameter 4 mm	CHARI SPEED, cm/min	
Liquid Phase (% wt.)3% 0V-1	05150100 500	
Support Supelcoport	DETECTOR <u>ECD</u>	
Mesh 100/120	Range 10	
CARRIER GAS N2	Attenuation 16	
Rotameter	TEMPERATURE, °C	
Inlet Pressure, psig	Detector 300	
Flow Rate, mL/min. 60	Injection Port 220	
	Column	
HALL DETECTOR	Initial	
Mode	Program 190 isothe	
Solvent	Final	
Solvent flow, mL/min.		
Reactor tube temperature, °C	PURGE AND TRAP	
Reactor gas	Purge time	Temp.
Reactor gas flow, mL/min.	Purge flow	
	Desorb time	Temp.
	Bake time	Temp.
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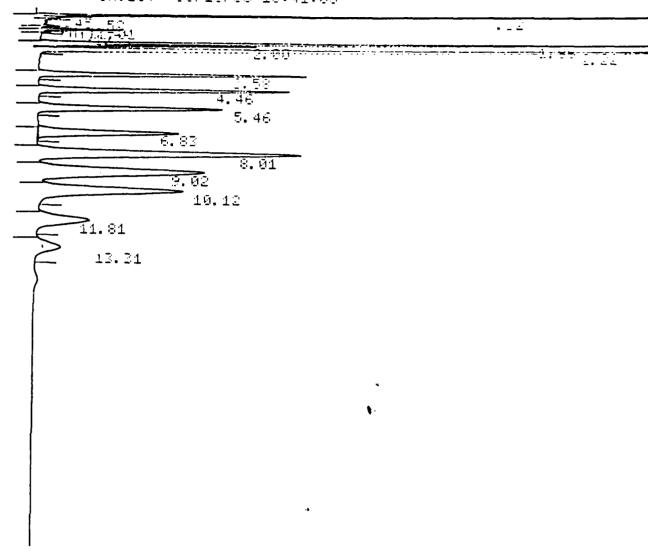
238082

TT= +.A FAULT 100: AT 9110

144.4-407 3.01

13.31

CHANNEL A . INJECT 08/18/86 10:41:05



PEST MIX 4-158-73 **0**8/18/86 10:41:05 CH= "A" PS= FILE 1. METHOD Ð. RUN 32 INDEX 32 ANALYST: K. JUREK PEAK# AREA% RT AREA BO 8.785 0.32 167518 03 0.583 1.17 11123 01 -K-BHC 8.898 1.86 169680 02 4B-BHC 2.654 2. 50610 02 51-4-8HC14, 774 2.22 281721 03 E HEPT. 5.922 3.58 112924 91 7ALOXIN 6.869 4.46 130977 01 8 HEPT. EPOX 6. 176 117778 01 5.46 94-EXOUS 5.911 6.83 112710 01 246528 02 215231 02 1801EL+00612.928 8.01 11 ENOVB-ENDY 287 9.02 13END ALOT 100 469 10.12 180559 03 13END 504 3.736 H-479 11.81 71238 91

38324 01

•			
,			•
		<del></del>	
	CHROMATOGRAPI	HIC CONDITIONS	
	Operator	Dat e	
	Job Number	Sample Identification	
	Solvent NA	Analytical Method EPA 601	
	Instrument Varian 6000 #4		
	COLUMN	CHART SPEED, cm/min. 0.5	
	Type Stainless Steel	DETECTOR Hall Electrolytic Conductivity	
	Length 8'	Range 10	
	Diameter 1/8"	Attenuation 256	
	Liquid Phase (% wt.) 1% SP1000	Acceluation 220	
	Support Carbopack B	TEMPERATURE, °C	
	Mesh <u>60/86</u>	Detector 950	
	CARRIER GAS Nitrogen	Injection Port 220	
	Rotameter NA	Column	
	Inlet Pressure, psig 60	Initial 45/3 min.	
	Flow Rate, mL/min- 40	Program 8/min.	
		Final 220	
	HALL DETECTOR	PURGE AND TRAP	
	Mode <u>Halogen</u>	Purge time 12 min. Temp. 30	
	Solvent <u>1-Propanol</u>	Purge flow 40ml/min.	
	Solvent flow, mL/min. 0.5	Desorb time 4 min. Temp. 180	
	Reactor tube temperature, °C <u>950</u>	Bake time 15 min. Temp. 200	
	Reactor Gas Hydrogen		
	Reactor gas flow, mL/min. 50	•	
		238082	
			,
		A90	
	H-	480	

ZERO: 5% 5 MIN/TICK ATTEN: 128 0 135 CHLOPOMET 2.399 BRUMOMET 3 898 ₩F€/F2CL2 5-474 CLORDET MECL 2 0 719 CL2F/11DC 10 1 75 7 24 1,10CA 11 965 T1:2DCE CHCL3 11 114 1,2DCANE 13 889 111 TCANE CCL4 CL2BR 16.000 16.696 DCAZDCE ⇒11 438 =18 171 TCE TCAZBORZO ⊐18 896 CHBP2CL 20 155 CHERS 20 942 21.563 ⊒23.914 CL4ENE/AN CLBZ 26 689 27.950 29.116

CHART SPEED 0.5 CM/MIN

CHANNEL: 5A - 1 TITLE: RUN# 1 10:16 12 SEP 86 SAMPLE: 2-158-73 METHOD: HALLSA CALCULATION: ES - CALIB PEAK PEAK RESULT TIME TIME AREA W1/2 SEP NO NAME FACTOR (MIN) OFFSET COUNTS CODE (SEC) 2.399 1 CHLOROMET 0.0974310 -0.021 5131856 ΒV 14.00 2.977 609296 VV ? 29.56 3.199 3 743958 VV ? 21.88 3.470 498294 VV 7 29.31 5 BROMOMET 0.087519U 3.898 -0.032 5713039 VV 20.00 4.355 VV 962101 ? 12.50 7 VIC/F2CL2 0.1035210 4.810 -0.020 9659916 UΨ 18.31 5.474 ? 27.50 1126481 VV 9 CLOROET 0.0320930 5.970 -0.020 15579580 VV 18.13 H-481 7.015 10 2168279 IJΨ 16.44 11 7.344 WU ---- 2" 18.00 238884

CHANNEL: 5A - 1 TITLE: RUN# 1 10:16 12 SEP 86

SAMPLE: 2-158-73 METHOD: HALLSA CALCULATION: ES ~ CALIB

PEAK PEAK	DCCIII T	TIME	TIME	۸۵۳۸	SEP		W1/2
NO NAME	RESULT FACTOR	(MIN)	OFFSET	AREA COUNTS	CODE		(SEC)
1 CHLOROMET	0.0974310	2.399	-0.021	5131856	BV		14.00
2	0.03/43/0	2.977	0.021	609296	υŪ	7	29.56
3		3.199		743958	VV		21.88
4		3.470		498294	VV		29.31
5 BROMOMET	0.087519U	3.898	-0.032	5713039	ΰů		20.00
6	0.00.0.00	4.355	0.502	962101	νν	7	12.50
7 VIC/F2CL2	0.1035210	4.810	-0.020	9659916	VV		18.31
8		5.474		1126481	VV	7	27.50
9 CLOROET	0.032093U	5.970	-0.020	15579580	VV		18.13
10		7.015		2168279	VV		16.44
11		7.344		238664	VV	7	16.00
12 MECL2	0.053566U	8.095	-0.025	9334318	UV		13.50
13		8.719		440351	VΒ	7	11.50
14		9.442		176380	ΒV		8.00
15		10.253		115136	VV		7.31
16 CL2F/11DC	0.114835U	10.752	-0.018	8708131	VV		13.63
17		11.124		10034038	VV		13.56
18 1,1DCA	0.0323590	11.965	-0.025	15446681	VV		13.00
19 T1,2DCE	0.035838U	12.654	-0.026	13951691	VV		13.31
20 CHCL3	0.018461U	13.134	-0.016	27084236	VV		14.50
21 1,2DCANE	0.023147U	13.889	-0.021	21601340	VV		14.38
22		14.780		739027	VV	?	17.13
23 111TCANE	0.030814U	15.205	-0.015	16226393	VV		14.81
24 CCL4	0.02720ZU	15.595	-0.015	18381030	VV		14.44
25 CL2BR	0.025793U	16.000	-0.020	19385158	VV		17.56
26		16.606		997365	VV		11.44
27		16.893		582530	VV	7	13.98
28 DCA/DCE	<b>0.0</b> 26633U	17.499	0.019	37547632	VV		30.58
29 TCE	0.016217U	18.171	-0.039	3083   1932	VV		16.69
30 TCA/DCP/C	0.023861U	18.896	-0.034	62863352	VV		17.31
31 CHBRZCL	0.025384U	20.155	-0.055	19697088	VV		19.38
32		20.942		402948	VV		12.63
33		21.205		273408	VV	?	12.25
34 CHBR3	0.1119840	21.563	-0.047	4464927	VB		19.06
35 CL4ENE/AN	0.012476U	23.914	-0.056	80151934	BV		15.88
36		25.757		87160	T		7.44
37		26.147		235562	T		5.94
38 CLBZ	0.048157U	26.689	-0.061	10382813	VV		18.06
39		29.116		212698	BB		5.88

TOTALS: -0.547 452786720

DETECTED PKS: 42 REJECTED PKS: 3

AMT STD: 1.00000

NOISE: 880.0 OFFSET: 1601

NOTES:

Secon macroscopic deservation provinces exception literatures

NOTEBOOK: 233-140 ANALYST: K.JUREK

SECURE AREA: E JOB#:U-4081

INST: VARIAN 6000#4 HALL 10X1 ATTN: 128

COLUMN:8'SS 1/8"OD CARBOPACK B

				- · ·				
13		•	8.719		440351	UB	7	11.50
14		•	9.442		175380	ΒV		8.00
15			10.253		. 115136	VV		7.31
16	CL2F/11DC	0.114835U	10.752	-0.018	8708131	VV		13.63
17			11.124		10034038	VV		13.56
18	1,1DCA	<b>0.0</b> 32369U	11.965	-0.025	15446681	VV		15.00
19	T1,2DCE	0.035838U	12.654	-0.026	13951691	VV		13.31
20	CHCL3	0.018461U	13.134	-0.015	27084236	Ui		14.50
21	1,2DCANE	0.023147U	13.889	-0.021	21601340	VV		14.33
22			14.780		739027	VV	7	17.13
23	111TCANE	0.030814U	15.205	-0.015	16226393	VV		14.81
24	CCL4	0.027202U	15.595	-0.015	18381030	VV		14.44
	CL2BR	0.025793U	16.000	-0.020	19385158	VV		17.56
26			16.606		997365	VV	7	11.44
27			16.893		582530	VV	?	13.88
28	DCA/DCE	0.026633U	17.499	0.019	37547632	VV		30.50
29	TCE	0.015217U	18.171	-0.039	3083 1932	VV		16.69
30	TCA/DCP/C	0.023861U	18.896	-0.034	6286\3352	VV		17.31
31	CHBR2CL	0.025384U	20.155	-0.055	19697088	VU		19.38
32			20.942		402948	VV	7	12.63
33			21.205		273408	VV	7	12.25
34	CHBR3	0.111984U	21.563	-0.047	4464927	VB		19.06
35	CL4ENE/AN	0.012476U	23.914	-0.056	80151934	BV		15.88
36			25.757		87160	Τ		7.44
37			26.147		235562	T		5.94
38	CLBZ	0.048157U	26.689	-0.061	10382813	VV		18.05
39			29.116		212698	BB		5.88

TOTALS: -0.547 452786720

DETECTED PKS: 42 REJECTED PKS: 3

AMT STD: 1.00000

NOISE: 880.0 OFFSET: 1601

NOTES:

NOTEBOOK: 233-140 ANALYST: K.JUREK

SECURE AREA: E JOB#:U-4081

INST: VARIAN 6000#4 HALL 10X1 ATTN: 128

COLUMN:8'SS 1/8"OD CARBOPACK B

LIQUID PHASE: 1%SP-1000 CARRIER GAS N2@40ML/MIN

DET:950C INJ:220C

OVEN TEMP: 45C/3MIN 8C/MIN 220C

5ML P&T

POST RUN:

SAVE FILE: RAW HAL0863

# ecology and environment, inc. A N A L Y T I C A L S E R V I C E S C E N T E R CHROMATOGRAPHIC CONDITIONS

Operator	Date
Job Number	
Solvent	
Instrument HP - MSD	
COLUMN	DETECTOR Mass Spec
Type Capillary	Mass Range
Length 30m	Attenuation
Diameter 0.32mm	
Liquid Phase (% wt.) DB-5	
Support fused silica	
Mesh NA	
CARRIER GAS He	
Rotameter NA	
Inlet Pressure, psig 50	
Flow Rate, mL/min. <u>0.5-0.75</u>	

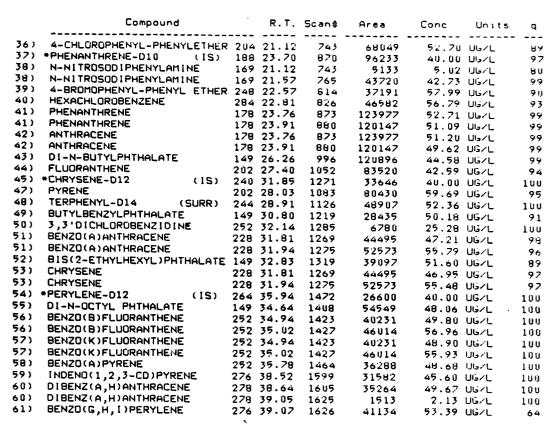


### QUANT REPORT

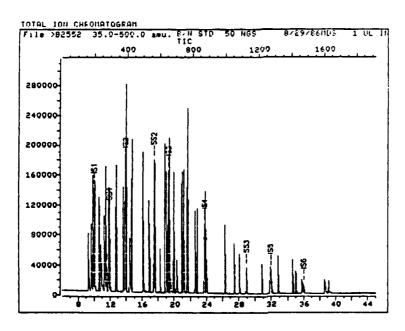
Wuant Time: 860829 11:23 Injected at: 860829 10:10 Operator 1D: USER6 Quant Rev: 4 Output File: ^82552::Q2
Data File: >82552::D4
Name: 8/N STD 50 NGS
Misc: 8/29/86MDS 1 UL INJ Dilution Factor: 1.00

ID File: BNB14::D2 Title: BN ID FILE FOR THE MSD (INITIAL CAL.) Last Calibration: 860731 15:45

	Compound		R.T.	Scan#	Area	Conc	Units	9
1)	*1,4-DICHLOROBENZENE-04(15)	152	9.98	195	56599	40.00	∟′ والا	86
2)	ANILINE	93	9.27	160	86546	40.15	∟/والا	82
2)	ANILINE	93	9.63	178	77ú80	35.76	<b>リピノ</b> し	15
3)	81S(-2-CHLORGETHYL)ETHER	93	9.63	178	<i>77</i> 080	43.93	ひら/し	81
4)	1,3-DICHLOROBENZENE	146	9.84	188	98540	50.36	UI5/L	99
4)	1,3-DICHLOROBENZENE	146	10.02	197	99987	51.10	ひゅくし	97
5)	1,4-DICHLOROBENZENE	146	9.84	188	98540	50.92	UG/L	98
5)	1,4-DICHLOROBENZENE		10.02	197	99987	51.66	ひらくし	94
6)	BENZYL ALCOHOL	79	10.83	237	70526	46.17	ひらくし	92
ア)	1,2-DICHLOROBENZENE	146	10.57	224	97620	48.31	ひらくし	95
8)	BIS(2-CHLOROISOPROPYL)ETHER			260	177271	42.18	UG/L	100
9)	N-NITROSO-DI-N-PROPYLAMINE		11.75	282	<i>7573</i> 0	41.42	ひらくし	97
9)	N-NITROSO-DI-N-PROPYLAMINE		11.87	288	15722	8.60	ひらくに	86
10)	HEXACHLOROETHANE		11.46	268	46829	46.67	ひらくし	92
11)	*NAPHTHALENE-D8 (IS)		13.88	38 <i>7</i>	195418	40.00	ひらくし	100
12)	NITROBENZENE-D9 (SURR)		11.87	288	91481	46.71	ひらくし	96
13)	NI TROBENZENE		11.93	291	96573	47.12	<b>山ら</b> /し	95
14)	I SOPHORONE	82	12.70	329	184428	46.61		94
15)	BIS(-2-CHLOROETHOXY)METHAN			376	108144	48.57	ひらくし	97
16)	1,2,4-TRICHLOROBENZENE		13.84	385	93061	50.32	リシー	99
17)	NAPHTHALENE		13.94	39 U	253998	52.80		100
17)	NAPHTHALENE		13.98	392	1871	. 39	りらくし	100
17)	NAPHTHALENE	128	14.43	414	6562	1.36	با∕ بالا	100
18)	4-CHLOROANILINE		13.94	390	33921	17.60	ひらくし	16
18)	4-CHLOROANILINE		14.45	415	84265	43.71		98
19)	HEXACHLOROBUTAD LENE		14.66	425	66455	52. <i>7</i> 2		97
20)	2-METHYLNAPHTHALENE		16.08	495	146839	48.20	_	96
20)	2-METHYLNAPHTHALENE		16.38	510	3309	1.09	いらくに	86
21)	*ACENAPHTHENE-D10 (IS)		19.27	652	82600	40.00	UG/L	96
22)	HEXACHLOROCYCLOPENTAD I ENE	237	16.83	532	55052	58. <i>7</i> 2	با∕قالا	98
23)	2-FLUOROBIPHENYL (SUKR)		17.42	561	165695	60.30		من
24)	2-CHLORONAPHTHALENE		17.52	566	142486	57.11		97
25)	2-NITROANILINE		18.19	599	39390	43.46		93
26)	DIMETHYL PHTHALATE		19.01	639	156683	52.80		95
27)	4-NITROANILINE		19.51	664	20434	38.07		16
28)	DIBENZOFURAN		19.96	681	181158	54.32		100
28)	DIBENZOFURAN		19.92	684	1518		UG/L	100
29)	ACENAPHTHYLENE		18.76	627	220285	59.14		99
30)	FLUORENE		20.92	733	129836	52.65		95
31)	3-NITROANILINE		21.55	764	5758	18.04		69
32)	ACENAPHTHENE		19.35	656	147398	60.13		96
33)	2,4-DINITROTOLUENE		20.29	702	28432	36.05		100
34)	2,6-DINITROTOLUENE		19.01	639	1469		ひらくし	100
477	O A DINITOOTHINENE	144	19 14	445	30194	₹ف 44	10571	1 11 11



<sup>\*</sup> Compound is ISTD



Data File: >82552::04 Name: 8/N STD 50 NGS Misc: 8/29/86MDS 1 UL INJ

Id File: 8NB14::02

Title: BN ID FILE FOR THE MSD (INITIAL CAL.) Last Calibration: 860731 15:45

Operator ID: USER6
Quant Time: 860829 11:23
Injected at: 860829 10:10

### QUANT REPURT

Operator ID: USER6
Output File: ^82553::Q2
Data File: >82553::D4
Name: A/P STO 50 NGS Quant Time: 860829 11:49 Quant Rev: 4 Injected at: 860829 11:02 Dilution Factor: 1.00

Misc: 8/29/86MDS 1 UL INJ

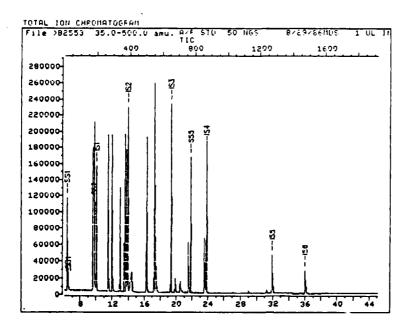
ID File: APBI4::02 Title: BNA ID FILE FOR THE MSD (INITIAL CAL.)

Last Calibration: 860731 17:03

	Compound		R.T.	Scan#	Area	Conc	Units	q
1)	*1,4-DICHLOROBENZENE-D4(	IS) 152	10.00	194	68445	40.00	UG/L	86
2)	PHENOL-D5 (SU	IRR) 99	9.73	181	129195	54. <i>7</i> 5	سا/فال	96
4)	2-FLUOROPHENOL (SUR	R) 112	6.35	15	76427	51.39	リらくし	97
4)	2-FLUGROPHENOL (SUR	R) 112	6.48	21	5596	3.76	ひらくし	87
4)	2-FLUOROPHENOL (SUR	R) 112	6.54	24	2277	1.53	UG/L	54
5)	PHENOL	94	9.79	184	117067	53.57	با / قالا	6 U
6)	2-METHYL PHENOL	108	11.48	267	939 <i>7</i> 9	51.71	UG/L	97
フ)	2-CHLOROPHENOL	128	9.55	172	110047	54.86	UG/L	96
8)	4-METHYL PHENOL	108	11.48	267	93979	51.38	UG/L	73
8)	4-METHYL PHENOL	108	11.99	292	95819	52.39	ひらくし	92
9)	*NAPHTHALENE-D8 (I	S) 136	13.90	386	264444	40.00	UG/L	100
10)	2-NITROPHENOL	139	12.93	338	67659	52.94	りらくし	92
11)	2,4-DIMETHYLPHENOL	122	13.50	366	95457	51.75	UG/L	91
12)	BENZOIC ACID	105	14.45	413	64161	40.57	UG/L	94
13)	2,4-DICHLOROPHENOL	162	13.74	3 <i>7</i> 8	85952	43.03	UG/L	96
14)	4-CHLORO-3-METHYLPHENOL	107	16.24	501	105102	48.03	リバシノレ	97
15)	*ACENAPHTHENE-D10 (I	S) 162	19.29	651	129459	40.00	じらノレ	98
16)	2,4,6-TRICHLOROPHENOL	196	17.24	550	85 <i>0</i> 5 <i>7</i>	59.03	りらくし	95
16)	2,4,6-TRICHLOROPHENOL	196	17.34	555	908 <i>77</i>	63.07	UGZL	98
17)	2,4,5-TRICHLOROPHENOL	196	17.24	550	8505 <i>7</i>	50.55	UG/L	97
17)	2,4,5-TRICHLOROPHENOL	196	17.34	555	90877	54.01	しじ/L	99
18)	2,4,6-TRIBROMOPHENOL(SU	RR) 330	21.77	773	56081	52.79	ひらくし	95
19)	2,4-DINITROPHENOL	184	19.84	678	17532	33.46	ひらくし	100
20)	4-NITROPHENOL	139	20.47	709	19963 -	38.00	UG/L	100
20)	4-NITROPHENOL	139	20.84	727	984	1.68	UG/L	100
21)	*PHENANTHRENE-010 (I	S) 188	23,72	869	214524	40.00	UG/L	93
22)	4.6-DINITRO-2-METHYLPHE	NOL 198	21.49	759	31206	40.74	با∕ والا	190
23)	PENTACHLOROPHENOL		23.54	860	41217	44.83	∟⁄دالا	100
24)	_		31.89	1271	81832	40.00		75
25)			35.96	1471	69008	40.00		100

<sup>\*</sup> Compound is 1STD





Data File: >82553::04 Name: A/P STD 50 NGS Misc: 8/29/86MDS 1 UL INJ

Id File: APBI4::D2 Title: BNA ID FILE FOR THE MSD (INITIAL CAL.)

Last Calibration: 860731 17:03

Operator ID: USER6

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Quant Time: 860829 11:49 Injected at: 860829 11:02

# ecology and environment, inc. A N A L Y I I C A L S E R V I C E S C E N I E R CHROMATOGRAPHIC CONDITIONS

Operator	Date					
Job Number						
Solvent	<del></del>					
Instrument HP - MSD						
COLUMN	FID GAS					
Type <u>Capillary</u>	Hydrogen, ml/min.					
Length 30m	Air, ml/min.					
Diameter 0.32mm	CUADT CDCCD / :					
Liquid Phase (% wt.)DB-5	CHART SPEED, cm/min.					
Support <u>fused silica</u>	DETECTOR Mass Spec					
Mesh NA	Range 35-500					
CARRIER GAS He	Attenuation					
Rotameter NA	TEMPERATURE, °C					
Inlet Pressure, psig50	Detector					
Flow Rate, mL/min. 0.5-0.75						
•	Column					
SPL1T	Initial					
	Program					
HALL DETECTOR	Final					
Mode	-					
Solvent						
Solvent flow, ml/min.						
Reactor tube temperature, °C	<del>-</del>					
Reactor gas	Desorb time Temp					
Reactor gas flow, ml/min.	Bake time Temp.					

### QUANT REPORT

Jperator ID: USER6 Quant Rev: 4 Quant Time: 860829 11:49 Jutput File: 082553::02

Jata File: >82553::D4

Jame: A/P STD 50 NGS

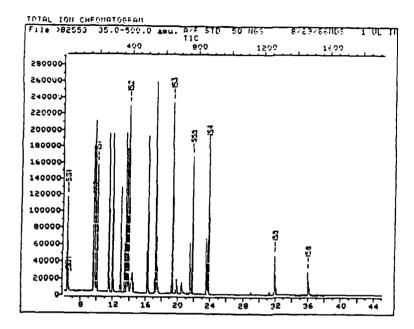
Jisc: 8/29/86MDS 1 UL INJ Injected at: 860829 11:02 Dilution Factor: 1.00

D File: APB14::D2 Title: BNA ID FILE FOR THE MSD (INITIAL CAL.) .est Calibration: 860731 17:03

	Compound		R.T.	Scan#	Area	Conc	Units	q
1)	*1,4-DICHLOROBENZENE-D4(IS	) 152	10.00	194	68445	40.00	NEZI	 86
2)	PHENOL-D5 (SURR		9.73	181	129195			96
4)	2-FLUOROPHENOL (SURR)	112	6.35	15	76427	51.39		97
4)	2-FLUOROPHENOL (SURR)	112	6.48	21	5596		∟ کال	87
4)	2-FLUOROPHENOL (SURR)	112	6.54	24	2277		UG/L	5.4
5)	PHENOL	94	9.79	184	117087	53.57		6 U
6)	2-METHYL PHENOL	108	11.48	267	93979	51.71	Ub/L	97
7)	2-CHLOROPHENOL	128	9.55	172	110047	54.86		96
8)	4-METHYL PHENOL	108	11.48	267	93979	51.38	UG/L	73
8)	4-METHYL PHENOL	108	11.99	292	95819	52.39	UIS/L	92
9)	*NAPHTHALENE-D8 (IS)	136	13.90	386	264444	40.00	UG/L	100
0)	2-NITROPHENOL	139	12.93	338	67659	52.94	りらくし	92
1)	2,4-DIMETHYLPHENOL	122	13.50	366	95457	51. <i>7</i> 5	ひらくし	91
2)	BENZUIC ACID		14.45	413	64161	40.57	ひはイレ	94
3)	2,4-DICHLOROPHENOL	162	13.74	3 <i>7</i> 8	85952	43.03	U6/L	96
4)	4-CHLORO-3-METHYLPHENOL	107	16.24	501	105102	48.03	Uls/L	97
5)	*ACENAPHTHENE-D10 (IS)		19.29	651	129459	40.00	Ula/L	98
6)	2,4,6-TRICHLOROPHENOL	196	17.24	550	85057	59.03	リルノレ	95
6)	2,4,6-TRICHLOROPHENOL		17.34	555	90877	63.07	UG/L	96
7)	2,4,5-TRICHLOROPHENOL	196	17.24	55 Ú	85U5 <i>7</i>	50.55	UG/L	97
7)	2,4,5-TRICHLOROPHENOL		17.34	555	908 <i>77</i>	54.01	しらくし	99
9)	2,4,6-TRIBROMOPHENOL(SURR			773	56081	52.79	りはノレ	95
9)	2,4-DINITROPHENOL	184	19.84	678	1 <i>7</i> 532	33.46	ししん	100
0)	4-NITROPHENOL	139	20.47	7119	19963	38.00	UG/L	190
0 )	4-NITROPHENOL	139	20.84	727	884	1.68	UG/L	100
1)	*PHENANTHRENE-D10 (IS)		23.72	869	214524	40.00	しはノレ	93
2)	4,6-DINITRO-2-METHYLPHENO	_ 198	21.49	759	31206	40.94	با∕ حالا	100
3)	PENTACHLOROPHENOL	266	23.54	860	41217	44.83	ا/والا	100
4)	*CHRYSENE-D12 (IS)	240	31.89	1271	81832	40.00	ひらくし	75
5)	*PERYLENE-D12 (IS)	264	35.96	1471	69008	40.00	UG/L	100

<sup>\*</sup> Compound is ISTD





Data File: >82553::04 Name: A/P STD 50 NGS Misc: 8/29/86MDS 1 UL INJ

Id File: AP814::D2

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Title: BNA ID FILE FOR THE MSD (INITIAL CAL.)

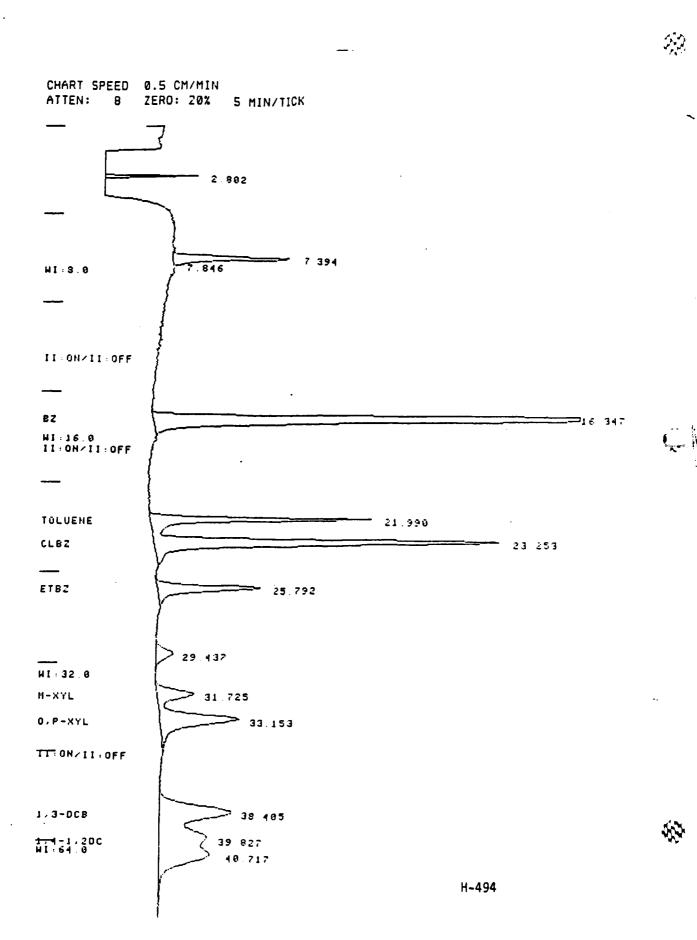
Last Calibration: 860731 17:03

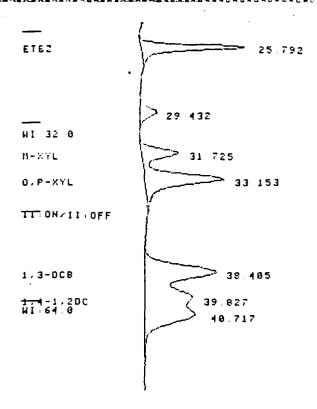
Operator ID: USER6

Quant Time: 860829 11:49 Injected at: 860829 11:02

### Ecology and Environment, Inc.

Operator	Date _October 7, 1986
Job Number	Sample Identification
Solvent	Analytical Method EPA-602
Instrument Varian 6000 #1	
COLUMN	FID GAS
Type Stainless Steel	Hydrogen, ml/min. 30
Length 8 ft.	Air, ml/min. 300
Diameter 1/8 inch Liquid Phase (% wt.) % SP1000	CHART SPEED, cm/min. 0.5
Support Carbopack B	DETECTOR PID
Mesh 60/80	-11 Range 10
CARRIER GAS <u>Nitrogen</u>	Attenuation 8
Rotameter NA	TEMPERATURE, °C
Inlet Pressure, psig 60	Detector 300
Flow Rate, ml/min. 40	Injection Port 220
	Column
	Initial 45 3 minutes
·	Program 10/min.
	Final 220
	PURGE AND TRAP
	Purge time 11 min. Temp. 30°C
	Purge flow 40 ml/min.
	Desorb time 4 min. Temp. 180°C
	Bake time <u>15 min.</u> Temp. <u>200 °</u> C





RECALCULATE ON FILE: FY1139 /

CHANNEL: 2B - 1 TITLE: RUN#

25 SEP 86

19:45

SAMPLE: 2-158-82 METHOD: AROCONF CALCULATION: ES - CALIB PEAK PEAK RESULT TIME TIME AREA W1/2 NO NAME FACTOR (MIN) OFFSET COUNTS CODE (SEC) 1 BZ 0.1950240 16.347 -0.003 2563789 BB 18.13 2 TOLUENE 0.769792U 21.990 0.000 649526 ΒV 14.13 3 CLBZ 0.3861110 23,253 0.003 1294963 VΒ 19.31 4 ETBZ 1.195312U 25.792 0.002 418301 ВВ 21.25 5 29.432 110441 ? 36.88 ВB 6 M-XYL 2.2310170 31.725 -0.005 224113 вν 34.56 7 O.P-XYL 1.7137400 33.153 0.003 583519 39.50 VΒ 8 1,3-DCB 0.749118U 38.405 -0.005 667452 ΒV 53.31 9 1,4-1,200 2.262996U 39.827 -0.003 441892 VV 7 68.81 40.717 537510 VΒ ? 83.38 TOTALS: -0.008 7491506

3

REJECTED PKS:

AMT STD: 1.00000

DETECTED PKS:

NOISE: 125.7 OFFSET: -625

NOTES:

COCCESSAT INCOCOCOCA INCOCOCA PERFORMANTA INCOCOCA ANALYSIAN INCOCOCA

NOTEBOOK:228-93 ANALYST:RICHARD SAMSON

13

SECURE AREA: E JOB#U-4164

INST: VARIAN 6000#1 PID 10X1 ATTN: 8

COLUMN48185 1/8" OD



GEOPHYSICAL DATA

			HYSICAL S and EM Da		÷.
	x	Υ	MAG	EM	
	o,	<u>o,</u>	52164	0.42	
	্, ৃ	25. 30.	53021 51560	0.37 0.28	
	ő,	75,	51800	0.28 0.34	
	o,	iōō,	51873	0.35	
	٥,	125,	51932	0.32	
	٥,	150,	52039	0.32	
	٠, ^	175,	52335	0.33 2.4	
	্, ৃ,	200, 225,	52377 51714	0.44 0.49	
	o,	230,	52048	0.46	
	٥,	275,	52006	o.55	
	0,	300,	51257	0.40	
	٥,	325,	51654	0.30	
	O, O,	350, 375.	51810 51867	0.28 0.32	
	ँ,	400.	51880	0.32 0.38	
	5Ó,	400,	51641	0.27	
	ვი,	375,	51787	0.25	
	<b>5</b> 0,	350,	51564	9.30	
	30, 50,	32 <b>5,</b>	31776 51906	0.35 6.35	
•	50, 50,	300, 275,	51829 51674	0.39 0.44	
	50,	273, 250,	51294	V.44 V.50	,
	50,	225,	54938	0.41	
	50,	200,	52001	0.30	
	<u>5</u> 0,	175,	51619	0.33	
	50,	150,	51 <i>7</i> 33	0.39	
	ຣິ, ຣິດ,	125, 100,	51671 51410	0.38 6.√=	
	30, 30,	75,	51410 51178	୍.୪୪ ୦.୭୦	
	5°,	50,		୦.୪୯ ୦.୪୫	
	50,	25,	52217	0.33	
	50,	٥,	51966	0.39	
	100,	0,	51945	0.43	
	100, 100,	25, 50,	52214	0.46 6 <b>75</b>	
	100,	50, 75,	52046 53379	0.37 0.42	
	100,	100,	52087	0.6:	
	100,	125,	51166	0.53	
	100,	150,	51554	0.44	
	100,	175,	52419	o.48	
	100, 100,	200,	51546 50070	0.45	
	100,	225, 250,	50932 51597	0.37 0.34	
	100,	235, 27 <b>5</b> ,	51781	0.34	
	100,	300,	52171	0.33	
	100,	325,	51654	0.3 <u>2</u>	
	100,	350,	51715	୍.ଅଧ	ภ์เ
	100,	400,	51601	<b>∂.</b> 3√	V
			I-2		

D-1 LANDFILL GEOPHYSICAL SURVEY Magnetometer and EM Data (cont.)

X	Υ	MAG	EM
100,	425,	51503	0.29
100,	4 <b>5</b> 0,	51737	0.28
100,	475,	51828	0.33
150,	300,	51826	0.37
150,	475,	51745	0.33
150,	450,	51588	0.25
150,	425,	51372	0.32
150,	40C,	52342	0.39
150,	375,	52201	০. ভঙ
150,	350,	5t178	0.34
150,	325,	51240	0.37
150,	300,	51200	0.44
150,	275,	50464	0.47
150,	250,	51778	0.66
150,	225,	52950	0.54
150,	200,	32345	ા. ∔ઠ
150,	175,	51945	0.50
150,	150,	52548	0.45
150,	125,	52495	0.38
150,	100,	52249	0.34
150,	75,	51784	0.43
150,	50,	52377	ં.૩૬
150,	25,	52357	0.54
150,	્,	52018	0.44
200,	o,	52350	0.45
200,	25,	52644	0.46
200,	50,	51585	0.37
200,	100,	51901	.0.34 0.37
200. 200.	125, 150,	51761	0.34
200,	175,	52015 52171	
200,	200,	52861	0.31 0.40
200,	225,	52862	0.60
200,	250,	51819	0.80
200,	275,	51867	0.51
200,	300,	53239	0.43
200,	325,	51806	0.55
200,	350,	50480	).47
200,	375,	51379	0.34
200,	400,	51846	0.38
200,	425,	51650	0.37
200,	450.	52347	0.43
200,	475,	31099	6.47
200,	<b>5</b> 0.	51150	0.40
200,	525,	51624	0.40
200,	550,	51783	0.41
250,	· 600,	51849	0.43
250,	575,	51768	0.39
250,	550,	51707	0.41
250,	525,	51371	0,42

D-1 LANDFILL GEDPHYSICAL SURVEY Magnetometer and EM Data (cont.)

X	Y	MAG	EN
250,	500,	51119	0.54
250,	475,	52123	0.56
250,	430.	52316	0.43
250.	425,	51742	0.33
250,	400,	51313	0.32
250,	375,	51163	0.36
250,	350,	51824	0.43
25°,	325,	57278	0.44
250,	300,	50846	0.43
250,	275,	50704	0.54
230,	250,	53548	0.53
250,	225,	53164	0.40
250,	200,	52380	0.31
250,	175,	52122	0.31
250,	150,	52004	0.33
250,	125,	51961	ે. 35
250,	100,	51932	0.28
250,	• 75,	5.910	ે. 2€
250,	કહે,	51812	0.38
250,	25,	32284	0.43
250,	a,	51762	0.43
300.	୍ର,	51726	0.39
<b>ദ</b> ാം.	25,	51873	0.35
300,	50,	51882	0.33
300,	75,	51905	0.31
300,	ıoo,	51924	0.25
300,	125,	51930	0.27
300,	150,	51945	0.33
300,	200,	51964	0.36
300,	225,	5205 l	0.34
Soo,	250,	5214t	0.35
300,	275,	52425	0.33
300,	300,	53130	0.39
300, -	325,	52913	0.50
300,	350,	51953	0.50
300,	375,	51746	0.41
300,	400,	52465	Ç•, ⊊#
300.	425,	52060	0.55
300,	450,	50902	0.52
300.	475.	51419	0.53
300,	50°,	51994	0.32
300,	525,	52768	0.57
zoo,	550,	51264	0.32
300,	575,	51060	0.42
300,	۵00,	51584	0.35
300,	<b>525</b> ,	51763	0.38
300,	<u>550,</u>	5:83&	0.11
300,	675,	51856	0.69
350,	700,	51371	
350.	675,	51862	0.38

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	D-1 LAND	FILL GEOP	'HYSICAL	GURVEY	
<b>Š</b>	Magnetom	eter and	EM Data	(cont.)	
<u>.</u>	Х	Υ	MAG	EM	
	350,	65O,	51799	o.30	
	350,	625,	51691	0.30	
	350,			0.33	
	350, 350,			0.30 0.33	
	350 <b>,</b>	575 <b>,</b>	50980		
	350,	550,	52386	0.5 <sup>6</sup>	
	330, 350,	525,		0.40 0.39	
	350. 350.	500, 475,		0.50 0.50	
	350,	•	52335	0.56	
			52830		
	350, 350,	400, 375,	521 <i>6</i> 8 52243	0.50 0.55	
	350, 350,	350,		0.46	
	350,	325,	52384	0.34	
	<b>350,</b>			6.33 0.30	
	•			0.30 0.30	
	350,	225,	51970		
	350,	200,	51932	0.32	
	350,	175, 150,	51905	0.3: 0.2a	
Ç.	350, 350.	125,		0.23	
V	350,	100,	51897	.o.25	
		75 <b>,</b>		0.2 <del>8</del>	
	350, 350,	50, 25,	51913 51925	0.35 0.3 <del>4</del>	
	350,	0,	51893	0.42	
	400,	ο,	51960	0.40	
	400,	25, 50		0.33 0.55	
	400, 400,	50, 75,	51823 51860	0.37	
	400.	100,	51930	0.31	
	400,	125,	51913	0.25	
	400, 400,	150, 175,	51914 51998	0.27 0.30	
	400, 400.	200,	51925		
	400,	225,	51920	0.36	
	400,	250.	51905	0.37	
	400, 400,	275, 300,	51933 51934	0.33 0.31	
	400,	325,	51948	0.33	
	400,	₹5°,	520 <b>5</b> 4		
	400, 400,	375. 400.	52438 <b>5</b> 30 <b>8</b> 9	0.36 1 0.42	
	400, 400,	400, 425,	52167		
	400,	450,	51583	0.41	
•••	400,	475,	53094 50777		
	400,	500,	52337	0.57	
			7 6		
			I-5		
	· · ·				

D-1 LANDFILL GEOPHYSICAL SURVEY Magnetometer and EM Data (cont.)

X	Y	MAG	EM
400,	52 <b>5</b> ,	50786	0.58
400,	550,	51321	0.45
400,	575,	53254	0.54
400,	600 <u>.</u>	51803	0.56
400.	625,	51894	0.32
400,	650,	31612	0.32
400,	675 <b>,</b>	51789	0.34
400,	700,	51826	0.38
400	725,	51852	0.30
450,	775,	51891	0.79
450.	750.	51386	0.44
450,	725,	51847	0.32
450,	700 <b>,</b>	51797	0.23
450,	675,	51720	C.30
450,	650,	51442	0.45
450,	625,	52506	0.54
450,	600,	51262	0.48
450,	575,	50835	0.53
450,	550,	52146	్.్ద
450,	525,	53474	0.47
450,	500,	51525	0.52
450,	475,	53167	0.59
450,	450,	53238	0.33
450,	425,	52436	0.36
450,	400,	52128	0.33
450,	375,	51987	0.33
450,	350,	51932	0.31
450,	325,	51987	0.30
450,	300,	51930	0.34
450,	275,	51913	0.33
450. 450.	250,	31725	0.37
450,	225,	51933	୍. 28
450,	200,	51923	0.31
450,	1 <i>7</i> 5, 150,	51898	0.30
450,	125,	51914 51908	<b>়.</b> 26
450,	100,	51927	$0.31 \\ 0.32$
450,	75,	51883	0.32 0.32
450,	50,	31746	0.37
450,	25.	52270	0.4€ 1.4€
450.	٠ <u>٠</u> ,	51963	0.45
500,	ં 🕯	51937	0.41
500,	žĠ,	51780	0.40
500.	ട്ഠ,	51891	∂.TE
500.	75,	51874	0.34
500,	100,	51884	0.40
<u>5</u> 00,	125.	51887	0.42
500.	150,	51873	0.73
500.	175.	51869	0.29
500,	200,	51927	0.24

D-1 LANDFILL GEOPHYSICAL SURVEY Magnetometer and EM Data (cont.)

Х	Υ	MAG	E)1
500,	225,	51895	0.32
500,	250,	51883	0.33
500,	250,	518697	0.40
500,	275,	51890	0.42
500,	275,	51901	0.40
500,	300,	51882	0.33
500,	325,	51907	0.32
500,	350,	51938	0.27
500,	375,	51995	0.25
500,	400,	52116	0.31
500,	425,	52501	0.34
500,	450,	53015	0.46
500,	475,	52019	0.57
soo,	500,	51692	0.12
500,	525,	53092	0.51
500,	550,	52612	0.62
500,	575,	51513	0.60
soc,	500,	50897	0.46
eo.	625,	51480	0.33
500,	650,	51664	0.29
500,	675,	51765	0.26
500,	700,	51844	0.31
500,	725,	51839	0.33
500,	750,	51866	0.50
550,	825,	51868	0.46
550, 550	800, 775	51826 5(813	0.31 0.28
<b>5</b> 50, 550,	775, 750,	51704	0.28
550,	725,	51499	0.32
550,	700,	51074	0.35
550,	675,	51099	0.42
550,	65°,	52074	0.51
550,	525 <b>,</b>	52595	0.54
550,	600.	51546	0.65
550,	575,	51577	0.53
5 <b>5</b> 0,	550,	52405	0.50
550,	525,	52201	0.62
550,	500,	52094	0.37
550,	475,	5/918	0.35
550,	450,	5:004	0.30
550,	425,	5 :75	0.31
550,	400,	51386	०.डाड
. 55o,	375,	51879	0.41
550,	350,	51844	().4A
550,	325,	51873	0.42
550,	<u>300</u> ,	51910	0.44
55°.	275,	51897	0.41
550,	250,	51997	0.32
550, 550	225,	51899	0.23
550,	200,	51703	0.27

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D-1 LANDFILL GEOPHYSICAL SURVEY Magnetometer and EM Data (cont.)

X	Y	MAG	EM
550,	175,	51915	0.33
5 <b>5</b> 0,	150,	51910	0.41
350, 550,	125, 100,	51897 51894	0.46 0.48
550,	50,	51874 51874	0.43
550,	25,	52037	0.36
550.	~,	51934	0.41
500,	ં,	51700	0.42
500,	25,	51893	ి. చేత
400.	50,	51688	0.33
കാഠം	75,	51898	0.37
٥٥٥,	100,	51867	୦.3୫
500,	125,	51867	0.37
500,	150,	51880	0.35
600,	175,	51895	0.30
600,	200,	51878	0.28
6∪0, 430	225,	51872	0.30
600.	250,	51673	0.33
გბა, გამ,	275, 300,	51863 51852	0 36 0.37
600.	325,	31848	0.40
500.	350,	51845	0.42
500,	375,	51829	0.49
600,	400,	51805	J.4e
600,	425,	31799	0.42
600 <b>,</b>	450,	51717	0.37
600,	475,	51688	0.39
400,	500,	51719	0.46
<u> </u>	325,	52076	0.55
600.	550,	51717	0.56
600, 600,	<b>573,</b>	52106	0.70 0.50
500,	600, 625,	52041 51353	0.74 0.52
600.	650,	52747	୦.୦୬ ୦. <b>୮</b> ୦
600.	675 <b>.</b>	52365	0.55
400°,	700,	50892	3.52
600,	725,	51350	0.40
acc.	750,	51562	0.30
500,	775.	51736	0.30
နည်လိန	300,	5:826	0.52
500,	825,	51362	0.33
600.	850.	51840	ା, ଅଧ୍
450, 786	900.	51870	0.45
630, 480,	875. 850	51819 51704	5. <b>3</b> 5
550.	850, 325,	51796 51500	0.39
650. 650,	323, 300.	51598 51151	0.36 0.40
550,	775.	50807	0.51
.50,	750.	52248	0.5t
త <b>5</b> ం.	725.	52367	0.51

D-1 LANDFILL GEOPHYSICAL SURVEY Magnetometer and EM Data (cont.)

		FILL GEO neter and		
	. <b>X</b>	Υ	MAG	Eh
•	650,	700,	50925	0.5
	450, 450,	675, 650,	52522 <sub>)</sub> 53257	0.a 0.9
	550, 550,	625, 600,	52040 65706	€.
	530, 530,	575,	52389 32420	্. ং
	650.	55°,	52014	0.5
	550, 650,	525, 500,	51621 52 <b>25</b> 2	ં. ં.:
	<b>55</b> 0,	475,	51837	0.5
	450, 450,	450, 425,	51730 51451	0.5 0.5
	<b>65</b> 0,	400,	51717	્ય. ુ.∠
	450,	375,	51783	0.4
•	450, 450,	350, 32 <b>5</b> ,	51823 51839	0.4 0.3
	450,	300,	51849	0.0
	650, 650,	275, 250,	5186 <i>7</i> 51876	
	450,	225,	51877	<b>Š</b> .:
	450, 450,	200, 175,	51884	0.3
عه <sup>ا</sup> غير.	450,	173,	51886 51887	0.3 0.3
<b>\</b> :	450,	125,	51822	0.3
	450, 450,	100, 75,	518 <b>97</b> 51897	
	<b>65</b> 0,	50,	51897	Ŏ.*
	450, 450,	25, o,	51918 51882	0.4 0.4
	700,	ő,	51900	0.3
	700, 700,	25,	51873	္.ဒ
	700,	50, 7 <b>5</b> ,	51873 51886	0.9 0.2
•	700,	100,	51874	0.3
	700, 700,	125, 150,	51879 51860	0.3 0.3
	700,	175,	51850	0.3
	700, 700,	200, 22 <b>5</b> ,	51859	0.3
	700,	220, 250,	51844 51852	0.3 0.3
	700,	275,	51822	0.3
	700, 700,	300, 3 <b>25</b> ,	51823 51769	0.4 0.4
•	700,	3 <b>5</b> 0,	51724	0.4
	700, <b>7</b> 00,	375, 400,	51791 52197	୍.5 ୦.5
	700,	425,	52101	୍. 5
	700, 700,	450, 475,	51841 52008	0.6 0.6
- <del> </del>	700,	500,	52023	0.6
•		1		
			I-9	

D-1 LANDFILL GEOPHYSICAL SURVEY Magnetometer and EM Data (cont.)

x	Y	MAG	EM
700,	525,	52193	0.62
700,	550,	51999	0.54
700.	575,	51573	0.43
700 Î	٤٥٥,	51273	0.41
700,	625,	51766	0.43
700,	650,	51955	♦.47
700,	675,	52116	0.44
700,	700,	52877	0.40
700,	725,	52053	ပ…ရာဂ
700,	750,	51011	0.34
700,	775,	52365	0.51
700,	800,	52058	0.74
<b>7</b> 00,	325,	50810	0.61
700,	850,	51297	0.43
700,	875,	51599	0.33
700,	900,	51799	0.35
700,	925,	51345	U.35
700 <sub>e</sub>	950,	5:636	0.42
TEO,	750 <b>,</b>	51833	$G_{\bullet}(\mathbb{Z}[2])$
<i>7</i> 50,	925,	51771	0.31
750,	900,	51538	0.38
750,	875,	50772	0.58
<i>7</i> 50,	350,	53396	ು.58
7 <b>5</b> 0,	825,	51115	0.62
750,	800,	52510	0.63
750,	775,	52518	0.45
750,	750,	51987	ા.૩૭
750,	725,	51770	0.33
750 <b>.</b>	700,	51714	0.37
750,	675 <b>,</b>	51438	0.48
750,	450,	51241	0.48
750,	625,	52052	0.59
750,	<u> </u>	52226	0.53
7 <b>5</b> 0,	575,	51900	0.48
750, 750	550,	51670	0.47
750.	525,	52078	0.53
250, 250,	500,	52334	0.59
750.	475, 450,	52439	0.64 0.59
750.	425.	52218 52293	0.60
750,	440. 400.	5170a	0.54
750,	375.	51708	0.54
750.	350,	51753	0,43 0,43
750,	325.	51759	യും എന
750,	300,	51824	0.42
750.	275,	51662	0.38
750,	250,	51841	0.39
750.	200,	51858	ō. 40
750,	175,	51867	0.44
750,	150.	51870	0.40

D-1 LANDFILL GEOFHYSICAL SURVEY Magnetometer and EM Data (cont.)

X	Υ	MAG	EM
750,	125,	51885	0.40
750,	100,	51884	0.33
750,	75,	51899	0.29
750,	5°,	51877	0.30
750,	25,	51906	೦.ತ
750,	٥,	51840	0.42
േരം,	্,	51999	୍. 49
ദ <b>ം</b> ,	25,	51831	0.41
800,	50,	51871	0.43
80,	75,	51854	0.42
800,	100,	51871	J. 44
ഭഠം,	125,	51856	0.43
800,	150,	51844	0.39
800,	175,	51891	0.38
800,	200,	51822	0.44
800,	225,	51789	0.44
800,	250,	51670	0.44
800,	275,	51505	0.57
800,	300,	51849	0.53
800,	325,	52343	0.51
800,	350,	51695	0.55
800,	375,	51944	0.58
800,	400,	52290	0.51
800, 800	425,	52029	0.59
800, 800,	450,	51970	0.55
800,	475, 500	51849 52023	0.51 0.34
800,	500, 525,	52487	0.51
800,	550,	51761	0.50
800,	573,	51761	0.47
800.	600,	52369	0.58
800,	625,	32200	0.55
800.	650,	51288	0.45
800,	675,	51349	0.45
ഭാവം	700,	51675	0.50
800,	725,	51431	0.52
800,	750,	51952	0.58
800,	775,	52373	0.82
ഭഠം,	ഭം.	52396	0.37
800,	825,	51850	0.53
800,	85°,	51672	0.48
800,	875,	51862	0.43
800,	900,	51860	০. এপ
aso,	<b>35</b> 0,	51839	0.43
850,	825,	51832	0.40
8 <b>5</b> 0,	800,	51777	0.39
850. 850	775,	51739	0.45
850, 850,	750, 785	51807	ୀ.65 ବ୍ୟବ୍ୟ
850,	725, 700.	52152 51949	0.89 0.51
,	7.00	U1/47	V2 = V2 I

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D-1 LANDFILL GEOFHYSICAL SURVEY Magnetometer and EM Data (cont.)

x	Υ	MAG	EM
830, 850, 850, 850, 850, 850, 850, 850, 85	450, 450, 450, 550, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450, 450,	MAG 5184775973444 2760555555555555555555555555555555555555	8059334770296509525721514445400193628317101380655455560000000000000000000000000000
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D-1 LANDFILL GEOPHYSICAL SURVEY Magnetometer and EM Data (cont.)

X	Y	MAG	EM
900,	550,	51944	0.53
900,	575,	52294	0.54
900,	600,	52013	0.43
900,	625,	32364	0.47
900,	650,	52347	0.48
900,	675,	52126	0.48
900,	700,	51937	0.52
900,	725,	51714	0.50
900,	7 <b>5</b> 0,	51708	0.15
900,	775,	51742	0.54
900.	ഭാം,	51778	0.36
900,	825,	51805	0.44
950,	800,	51824	0.43
950,	775,	51810	0.37
950,	750,	51769	0.28
950,	725,	51747	0,30
950,	700,	51732	ા 25
7 <b>5</b> 0,	675,	51757	0.30
950,	450 <b>,</b>	51319	0.33
950,	625,	52062	0.42
950,	600,	52404	0.46
950,	575,	52080	0.45
950,	550,	51858	0.43
950 <b>,</b>	525,	52189	0.50
950,	500,	51941	0.54
950,	475,	51 <i>797</i>	0.48
950,	450,	52692	0.62
950,	425,	52193	0.54
950,	400,	51850	ം 56
9 <b>5</b> 0,	375,	51982	ం.56
950,	350,	52046	0.59
950,	325,	51935	0.57
9 <b>5</b> 0,	300,	51771	0.50
95O,	275,	52015	0.55
950,	250,	52520	0.48
<b>75</b> 0,	225,	52270	0.53
950,	200,	51999	0.51
950,	175,	51784	0.56
950,	150,	51940	ં.5⊂
95O,	125,	51875	0.51
950,	100,	51904	0.43
950,	75 <b>,</b>	51896	0.35
950,	50,	51875	0.30
950,	25,	51902 51904	0.34
750,	o,	51394	0.40
1000,	), 25	51906	0.39 0.29
1000,	25,	51702 51600	0.29
1000,	50, 75.	51688 518 <b>9</b> 7	0.33
1000, 1000,	100.	51897 51894	0.55 0.48
1000	#1212 g	J1074	. +3

D-1 LANDFILL GEOFHYSICAL SURVEY Magnetometer and EM Data (cont.)

X	Υ	MAG	ΞM
1000,	125,	51879	0.51
1000,	150,	51920	0.49
1000,	175,	51890	0.5%
1000,	200,	51913	0.47
1000,	225,	51976	0.45
1000,	250,	51977	0.49
1000,	273,	52330	0.62
1000,	300,	52835	0.75
1000,	325,	52069	0.72
1000,	350,	52394	೧.১೮
1000,	375,	52179	0.59
1000,	400,	52045	0.64
1000,	425,	51374	0.58
1000,	450,	52476	ం.56
1000,	475,	52391	0.67
1000,	500,	51792	0.56
1000,	. 525,	52350	୍.53
1000,	550,	52502	୍.ଟ.
1000,	575,	51535	્. ઇક
1000,	500,	51750	୍.ଅନ
1000,	625,	51754	0.31
1000,	650,	51749	0.29
1000,	675,	51768	0.31
1000,	700,	51807	ા.૩2
1000,	725,	51789	0.33
1050,	650,	51806	0.33
1050,	625.	51774	়.ডঙ
1050,	600,	51748	0.32
1050,	575,	51749	0.31
1050,	550,	51739	0.34
:050,	525,	52021	0.40
1050,	500,	52631	0.56
1050,	473,	52541	0.67
1050,	450,	51900	0.67
1050,	425,	51625	0.36
1050,	400,	51755	ા.7દ
1050,	375,	51479	0.70
1050,	ౌ <b>5</b> ం,	54495	0.71
1050,	325,	53793	0.31
1050,	<u>soo,</u>	52115	္.၂5
1050,	275,	52240	0.69
1050,	250,	52134	ુ.હા
1050,	225,	52184	0.46
1050,	200,	51853	0.45
1050,	175,	51877	0.49
1050,	150,	51833	0.51
1050,	125,	51395	0.44
1050, 1050,	100,	51888 <b>5</b> 1888	0.41
•	75, 50,	51887 51879	0.32
1050,	و 100	01 <b>6</b> 24	ി.ട്

D-1 LANDFILL GEOPHYSICAL SURVEY Magnetometer and EM Data (cont.)

X	Υ.	MAG	EH
1050,	25,	51898	0.33
1050,	ં,	51912	0.41
1050,	ં,	51945	0.37
1100.	25,	51914	0.35
1100,	50,	51918	0.35
1100,	7 <b>5</b> ,	51913	0.40
1100,	100.	51699	0.42
1100,	125,	51879	0.51
1100.	150,	51388	V. 47
1100,	175,	51971	0.43
1100,	zoo,	52237	0.38
1100,	225,	52232	0.39
1100,	250,	52038	0.43
1100,	275,	51915	0.43
1100,	300,	51876	0.46
1100,	325,	51859	0.50
1100,	350,	51711	0.49
1100,	375,	51692	0.47
1100,	400.	52379	0.44
1100,	425,	52716	0.57
1100,	450,	52532	0.49
1100,	500,	51878	0.41
1100,	525,	51727	0.40
1100,	550,	51755	ા.૩৪
1100,	575,	51763	0.34
1100,	600,	51802	0.33
1100,	625,	51806	0.34
1150,	525,	. <b>5</b> 1822	0.37
1150,	500,	51811	0.37
1150,	475,	51790	0.42
1150,	450,	<b>5</b> 1784	0.42
1150,	423,	51856	0.35
1150.	400,	52718	્રાં, હુઇ
1150,	375,	53185	0.57
1150.	350,	52776	0.38
1150,	325, 700	51870 5:0/4	0.40
1150, 1150,	300, 275,	51864 51878	0.40 0.39
· ·			0.40
1150, 1.50,	250, 225,	51274 51924	4.
1150.	200,	51956	
1150.	175,	51719	0.42
1150,	150,	51913	0.41
1150,	125,	51917	0.48
1150,	100,	51914	0.46
1150.	75,	51892	0.40
1150,	50,	51915	0.37
1150,	25,	51920	0.34
1150,	o, '	51929	0.42
1200,	o,	51939	0.35
*	•		

	D-1 LAND Magnetom X	FILL GEO eter and	PHYSICAL 8 EM Data (	BURVEY	
	x	Υ	MAG	EM	63
	1200, 1200, 1200, 1200, 1200, 1200, 1200, 1200, 1200, 1200, 1200, 1200, 1200, 1200,	25, 50, 75, 100, 125, 150, 175, 200, 225, 300, 325, 350, 400, 425,	51928 51906 51914 51934 51891 51925 51900 51903 51964 51975 52340 52750	0.35 0.42 0.41 0.40 0.45 0.37 0.38 0.45 0.45 0.45 0.45 0.42 0.42 0.45 0.45 0.45	
	•				
	• .			,	ei
		·			
-					
					O
					₹
			I-16		

# D-4 LANDFILL SEDFHYSICAL SURVEY Magnetometer and EM Data

X	Υ	MAG	ΕH
ο,	٥,	52225,	ા. 24
o,	žś,	52867,	0.38
Ŏ,	50,	51750	0.3:
o,	75,	52073,	j. 28
ν, υ,	100,	51798,	0.17
·, •,	125,	51540,	0.Za
	150,	51340,	0.31
Ο,	175,	51552,	0.36
્.		51750,	
Ú,	200,		0.34
્,	225,	51875,	
Ο,	250,	51877,	0.25
٥,	275,	51881,	0.20
ο,	300,	51884,	0.25
O,	325,	51900	0.24
Ο,	<i>3</i> 50,	52151,	0.25
o,	375,	52412,	(.23
O,	400,	52145,	0.24
Ç.,	425	52269,	·
0.	450,	51897,	0.23
ં,	475,	51893,	0.22
و ن	500.	51891,	0.22
, 5ó,	500,	E1941,	-
5⊙,	475,	51938,	0.20
50,	450,	51945,	0.23
50,	425,	51900,	0.25
5°,	400,	51865,	0.26
50,	37 <b>5</b> ,	51927,	0.24
50,	350,	51933.	
50,	325,	51934,	0.22
50,	300,	51930,	0.22
50,	275,	51728,	0.24
50.	250,	51921,	0.29
	225,	51904,	
50,		51854.	
50,	200,	51972.	0.32
50,	175,	51756,	₩.₩. U.71
50,	150.		0.41
50,	125,	51632.	
50,	100,	51988,	0.20
50,	75.	51747,	1.24
50,	50,	51684,	.32
50,	25,	51418.	0.40
50,	O	52483.	0.29
50,	-25,	51948,	0.24
100,	-25,	31927,	9.22
100,	ο,	<b>5</b> 20 <b>5</b> 7,	0.25
100,	25,	51798,	0.29
100,	50,	51798,	0.34
100,	75,	51877,	0.37

D-4 LANDFILL GEOFHYSICAL SURVEY Magnetometer and EM Data (cont.)

X	Υ	MAG	EM:
100,	100,	51865,	0.42
100,	125,	51713,	0.30
100,	150,	52018,	0.18
100,	175,	51627,	0.33
100,	200,	51772	0.34
100,	225,	51878.	0.38
100,	250,	51877,	0.18
100,	273,	52221,	0.26
100,	.300,	54963,	0.22
100,	325,	54804,	0.24
100,	350,	52070,	0.24
100,	375,	51877,	0.24
100,	400,	51874,	೦.26
100,	425,	51887,	0.24
150,	425,	51929,	0.24
150,	400,	51927,	0.24
150,	375,	51931,	0.24
150.	350,	51933,	়.23
150,	325.	51925,	U.24
130,	300,	31910,	0.127
150,	275,	51906,	0.30
150,	250,	51908,	0.32
150,	225,	51378,	0.40
150,	200,	51862,	0.34
150,	175.	51702,	0.30
150,	150,	52155,	0.25
150,	125,	51931,	0.25
150, 150,	100,	52022,	0.32
150,	75,	51760,	0.46
150,	50, 25,	51657,	and the
150.		52436.	0.33
150,	∴, -25,	52008, 51377	0.25
200,	-25,	51766, 51848,	0.24
200,	0,	52428,	0.28 0.30
200.	25,	52200,	0.32
200,	50,	51653,	0.43
200,	75,	51868,	0.33
200,	100,	51714,	0.30
200.	125,	51877.	0.26
200,	150.	51863.	0.26
200	175.	52298.	0.24
200.	200,	52307.	5.35
200,	225.	52333.	0.33
200,	250,	52027,	0.42
200,	27 <b>5</b> ,	51702.	0.32
200,	300,	51963.	0.28
200,	325,	52236,	0.26
200,	350,	51914,	0.22
		4	

D-4 LANDFILL GEOFHYSICAL SURVEY Magnetometer and EM Data (cont.)

X	Υ	MAG	ΞM
200,	375,	51871,	0.20
200,	400,	52133,	0.20
200,	425,	51882.	0.20
250,	425,	51921,	0.20
25°,	400,	51921,	0.21
250,	37 <b>5</b> ,	51927,	0.21
250,	350,	51843,	0.22
250,	325,	51344,	0.24
250,	300,	51835.	0.27
250,	275,	52172,	0.30
250,	250,	51707.	0.44
250,	225,	51837,	0.40
250,	200,	52014,	0.34
250,	175,	51930,	0.29
250,	150,	51857,	0.25
250,	125,	51746,	0.30
250,	100,	51911,	0.27
250,	7E.	31334,	.32
250,	50,	51677,	Č.Sa
250Î	25,	32509,	
250,	11 g	52026,	5.54
300,	٥,	31744,	0.46
300,	25,	52250.	0.33
300,	50,	51922,	0.30
300 j	75,	52495,	0.30
300,	100,	52435,	0.33
300,	125,	54547.	0.32
300 j	150,	54755,	0.34
300.	175,	52541,	0.39
300,	200,	52128,	0.40
300,	225,	51455,	0.44
300,	2 <b>5</b> 0,	51909,	ು.≾৪
300,	275,	51935,	0.28
300,	300,	52044,	0.24
300,	325,	52011,	0.12
300,	350,	51857,	0.24
300,	3 <i>7</i> 5,	51858,	0.22
300,	400,	51885,	0.21
350,	400.	51853,	0.70
350,	375,	52460.	0.43
350,	350,	51914,	0.20
350,	325,	51852,	0.20
350,	300,	51897.	$\circ$ .TT
350,	275,	51776,	0.27
350,	250,	51756,	:.IS
330,	225,	52532,	0.48
350,	200,	52033,	ು.35
350,	175,	52254,	0.38
350,	150,	51809,	0.34
350,	125,	52085,	ે. ઉઠ

D-4 LANDFILL GEOPHYSICAL SURVEY Magnetometer and EM Data (cont.)

X	γ	MAG	EM
350,	100,	51976,	0.34
350,	75, <sup>*</sup>	52221,	0.41
350,	50,	51842.	0.38
350,	25,	52044,	U.40
350,	ο,	51829.	0.40
400.	ં,	51804,	0.31
400,	25,	52068,	ು.ತಹ
400,	ടം,	52817,	0.34
400,	75 <b>,</b>	53842.	0.42
400,	10ô,	52008.	2.43
400,	125,	52036.	0.33
400,	150,	51929	0.34
400,	175,	51640.	ు.ుద
400,	200,	51892,	0.39
400,	225,	52042,	0.64
400,	250,	52038.	়. 30
400,	275,	51982,	0.30
400,	300,	52180,	0.27
$a_{00}$	325,	51657,	0.24
400,	350,	51931,	0.23
400,	375,	51828,	0.23
400,	400,	5.658,	0.11
430,	400,	52209,	0.20
450,	375,	. 51865,	0.20
450,	350,	51949,	0.21
450,	325,	51728,	ં.⊋4
450,	300,	51755,	். 29
450,	275,	51971,	0.27
450,	250,	51933,	0.30
450,	225,	51941,	0.40
450,	200,	51862,	0.21
450,	175,	51922,	0.35
450,	150,	51318,	0.40
450,	125,	51799.	0.32
450,	100,	51660,	0.27
450,	75,	51805,	0.32
450,	50,	51890,	0.23
450,	25,	51759,	୍. ଅଧ
430,	٥,	51873,	ા.૩૯
500,	٠,	52533.	0.29
500.	25.	53605,	0.41
500,	<u>5</u> _,	53353,	0.40
500,	75.	52586,	0.34
50,	100,	51666.	0.30
500,	125,	51362,	0.53
500,	150,	51797,	0.36
500, 500	175,	51384,	(.33
500, 500,	200,	53453,	0. ZZ
500,	225, 250,	51927, 52450,	0.37 0.32
uww.	والباليند	(1	121 9 (2) (2)

# -D-4 LANDFILL GEOPHYSICAL SURVEY Magnetometer and EM Data (cont.)

X	Y	MAG	EM
500,	275,	51857,	0.25
500.	300:	52133.	0.24

# D-3 LANDFILL GEOFGYSICAL SURVEY Magnetometer and EM Data

X	Υ	7140	āħ.
Ú.	o,	5:879	0,32
ŏ,	Ž5,	51930	0.46
Č,	50,	51 <i>9</i> 79	0.91
Ŏ,	. 75,	52006	2115
i i i i i i i i i i i i i i i i i i i	100.	51938	2,05
Ö,	125,	51803	
0,	iso.	51847	0.60
Ŏ,	175.	51861	
Ō.	200,	51862	
ં,	225.	51860	i.j.j.
oʻ,	250,	51874	0.41
Ú,	275,	31776	್ ಕ
o,	soc,	53379	0.05
o,	325.	51895	1.40
وَ يَ	3 <b>5</b> 0,	<b>32</b> 106	1.20
ο,	375,	51967	0.39
o,	400,	51892	0.43
ં,	425,	51349	2.42
	450 <sub>a</sub>	51851	4.3E
50,	<b>់</b> ,	51857	1.15
<b>3</b> 0.	25,	51700	0.54
50,	50,	51700	0.40
50,	75,	31890	0.75
50,	100,	51975	0.10
ತ0,	125,	51883	0.53
50,	150,	51711	0.42
SO.	175,	51914	C. T.
50,	200,	5170 <b>5</b>	0.37
ვა,	225,	31905	
50,	250,	51905	To
50,	275,	51905	0.41
50,	<b>300</b> ,	51213	
30,	325,	51895	0.75
50,	350,	5 (90 <b>1</b>	24.30
30,	375,	5.370	0.36
5ਂ,	400,	51926	(i)
50,	425,	51952	0.32
50,	45 <b>.</b>	. <b>518</b> 30	0.24
100,	<u> </u>	51385	0.35
.00,	25.	51684	4.3
1000	<u>z</u> ę.	31535	0.57
160.	75,	51855	
100,	1 () () <sub>a</sub>	50853	0.02 3 45
100. 100.	125, 150,	51727 51045	
100,	150, 175,	31843 51851	0.3T
100,	200,	51860	0.35 0.35
100,	225,	51879	10 a 20 a 2 a 20 a
100.	250,	51834 51834	17 k 2500 17 k 2500
100.	230, 275.	51957	7.4E
<b>A</b> • • · · · •	Abec a medical	ed a the de	. · 'F-

D-3 LANDFILL GEOFHYSICAL SURVEY Magnetometer and EM Data (cont.)

X	Y	MAG	εiα
100,	300,	51410	0.02
100,	325,	51984	0.37
100,	350,	51352	
100,	375,	51913	0.33
i ô,	400,	51702	0.35 0.35
100;	425,	31703	1.54
100,	450,	51897	1.33
150,	ં,	51875	
150,	25,	51877	
150,	SO,	31866	
150,	75,	51835	
150,	100,	30347	0.02
(50,	125,	51863	
150,	150,	52035	in the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set of the set
150,	175,	51872	9.25
150.	200,	51864	
150.	225,	51873	Strain and a second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second sec
150.	250.	£1383	5.2 B
150,	275,	5.884	
:50,	300,	51877	اد اداده معلقه داده
150.	325,	51903	and the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second s
150,	350.	51895	C . 7.3
150,	375,	51877	9.30
150,	400,	51894	0.31
150,	425,	51681	0.30
150,	450,	51877	0.30
200,	ં,	51874	0.54
200.	25,	51864	0.17
200,	50,	51868	0.51
200,	75,	51849	ం. చేస
200,	100,	51247	0.12
200,	125,	51841	0.38
200,	150,	31875	÷, €, 4
200,	175,	52407	0 32
200,	200.	31834	
260,	225,	31849	vi vi 2.3
200,	250,	51897	0.34
200,	275,	5.877	4.
290,	300,	51435	1
200,	325 <u>,</u>	51702	(T) =
200.	350,	51889	
200,	375,	51973	·. ± 3
2004	40.0%	51375	C. T
200,	4US.	51892	4.12
200,	450,	51885	្. ភូម
250,	25,	51915	6.45
250,	50,	51906	0.45
250,	75,	51997	₩.43
250. 250.	100.	51554	80 4 1 E
والكائب شد	125,	51873	େ. ⊲ଅ

## D-3 LANDFILL GEOPHYSICAL SURVEY Magnetometer and EM Data (cont.)

x	Y	HAG	E۹
250,	150,	. 51903	0.41
250,	175,	51715	(1. )4
250,	200.	51754	ia. Le
250,	225,	51711	4.33
250,	236,	31368	57, 77
250,	275,	519(3	ú.S€
250,	300,	51929	0.70
250,	325,	G <b>1</b> 926	1, -
25°,	350,	51729	
250,	375,	51761	
250,	400,	51923	$C = A \hat{A}$
250,	425.	51926	0.13
250,	450,	51917	4.52
300,	۰,	51870	0.43
300,	2 <b>5</b> ,	51905	0.33
300.	50,	52815	1 4
300,	73,	51964	G
300,	100,	51869	
300,	125,	5 <b>PB</b> 70	W I.E.
300,	150,	51861	J. 17
300,	i75,	51871	Contraction
300,	200,	51845	0.55
300,	225,	51845	0.14
ತ00,	250,	51320	0.27
300,	275,	51619	1.40
300,	300,	51850	11.45
300,	325,	51859	0.47
300,	350,	51851	)
300,	37 <b>5</b> ,	51390	200
300,	400,	51857	୍.ଅଞ
-50,	O,	52120	1, <u>2</u>
50,	25,	51951	٠. ان
-30,	50,	51879	4.5 TET
-5º,	75,	51830	0.20
-50,	100,	51337	
-50,	125,	51848	9.52
-50,	150,	51931	∴. <u>5</u> 9
-50,	175.	51897	0.58
-50,	200,	51906	
-50,	22 <b>5</b> ,	51877	(y ) y H
-30, -50,	250, 275.	31399 51004	0.75
-50, -50,	2/3, 300.	51884	
-50,	325.	51434 51860	0.12 0.77
-50,	350,	51908	M. 30
-50,	330, 375,	51849	0,33
-50, -50,	37 <b>3,</b> 400.	51974	0.00 0.75
-50,	425,	52046	0.70
-so,	450.	51902	0.42
-100,	0,	51645	0.17
- 2	*		

D-3 LANDFILL GEOFHYSICAL SURVEY Magnetometer and EM Data (cont.)

X	Y	MAG	ΞM
-100,	25,	51842	0.33
-100,	50,	51831	<b>়.</b> ছেই
-100,	<i>7</i> 5,	51 <b>8</b> 0a	0.29
-100,	100,	51385	3.70
100,	125,	51865	4.75
-100,	150.	51833	فكفأ
- 100,	175,	01 <b>845</b>	1,59
-100,	200,	51842	0.50
-100,	225,	51840	المُعَانِينَ الْمُعَانِينَ الْمُعَانِينَ الْمُعَانِينَ الْمُعَانِينَ الْمُعَانِينَ الْمُعَانِينَ الْمُعَانِينَ
-100,	250,	51873	1.57
-100,	275.	51540	;
-100,	300,	51935	0.43
-100,	325,	51823	0.45
-100,	350,	<b>5</b> 1805	0.22
100,	37 <b>5</b> ,	51823	17. 3E
-too,	406,	51695	6.22
-100,	450,	51748	0.4
-106,	475,	51848	

D-11 LANDFILL GEOPHYSICAL SURVEY
EM Data

X	Υ	ΞM
·,	0,	0.15
Ο,	13,	0.33
$\Theta_{\sigma}$	33,	0.15
0,	45,	ં. (૦
$C_{\theta}$	32 <b>,</b>	$<$ . 1 $_{z}$
O.,	92,	). 13
O ,	147,	ાં. હ
O,	175,	11 15
	187.	02.20
$\mathcal{Q}_{\mathfrak{g}}$	200,	1.3
<b>ن</b> ,	204,	0.26
0,	219,	7.21
0,	223,	0.22
0,	247,	) 24
٠,	263,	0.23
O,	272,	9. ZZ
0,	287,	0.20
Ο,	278,	7-15
$\phi_{\mathfrak{g}}$	317,	0. I
0,	365,	=
O,	349,	0.20
ું,	378,	
٥,	384,	0.15
0,	374,	1.19
0,	400,	0.18
o,	416,	
<u>.</u> ,	427,	െ.ട
্,	435,	0 15
C.	500,	0.15 0.14
ું,	523,	0.1 <del>4</del> 0.15
0, 0,	545. 556,	0.14
o, o,	567,	0.1€
o, o,	565,	0.15 0.15
υ, υ,	510,	0.13
o, o,	625,	0.10
o, o,	645,	0.13
्, ्,	800,	0.14
56,	-800, -800,	0.16
50, 50,	789,	1.13
50, 50,	775,	0.4
50,	635, -	0.15
50₁	614,	0.16
50,	601,	0.12
sc,	523.	1.15
3),	500,	v.le
50,	192,	0.17
So,	184,	1.15
50,	474,	0.3
504	455,	2, 17
•	•	

D-11 LANDFILL GEOPHYSICAL SURVEY EM Data (cont.)

X	Υ		EM
50,	453,		0,20
50,	445,		0.19
50,	435,	•	0.20
50,	395,	•	0.19
50,	382,		0.18
50,	368,		0.17
50,	357,		0.13
50,	351,		0.17
50,	347,		1.45
50,	336,		3
50,	32 <b>s</b> ,		0.17
50,	322,		0.15
50,	315,		ು.18
50,	301, 237.		0.20 0.22
50, 50,	230,		0.20
50.	205,		0.19
50, 50,	191,		08
50,	138,		6.7
50,	177,		0.1 <u>2</u>
50,	ē8, <sup>*</sup>		*
so,	50;		0.14
50,	72,		0 15
50,	64,	•	0.14
50,	٥,	•	O = iA
-100,	ο,		0.17
-100,	9,		0.15
-100 <sub>a</sub>	20,		0.17
-100,	31,		0.10
-100,	55,		ំ3
-100,	96,		0.15
-100,	104,		0,14
-100, -100,	117,		9.15
-100,	142, 161,		0.15 0.15
-100,	179,		0.16
-150,	200,		0.15
-100,	223,		3.17
-100,	232,		
-100,	248,		0.18
-100,	251,		Ú
-100 ·	296,		0 13
100,	178,		0.17
-1⊖C <sub>9</sub>	313,		0.16
-100,	326,		10 a 22 cm
-100,	340,		).i9
-i00,	3 <b>5</b> 7,		0.24
-100.	361.		0.13
-100.	388,		0.17
-100,	400.		· · · · · · · · · · · · · · · · · · ·

'D-11 LANDFILL GEOPHYSICAL SURVEY
EM Data (cont.)

Х	Υ	EM
-100,	507,	0.19
-100,	520,	0.17
-100,	525,	0.15
-100,	546,	0.1/
-100,	560 j	0.14
-100,	600,	
-100,	617,	9.15
400,	<b>627</b> ,	0.14
-100,	433,	0.15
-160,	<u> </u>	
100,	671.	
100,	679.	
-100,	700,	0.15
-100,	727,	0.15
-100,	755,	(117
-100,	771,	0.1€
-50,	785,	03
-50,	564,	2.10
-30,	500,	9.1a
50,	460,	).1 <u>=</u>
-50,	400,	9. (7
-50 <sub>0</sub>	380,	(.,동
-50,	360,	0.19
-50,	350,	0.20
-50,	300,	0.18
-50,	280,	0.20
-50,	250,	0.16
50 <b>.</b>	215,	5.13
-50,	175,	0.15
-50,	150,	Q. 20
50,	140,	0.17
-50,	125,	1.3
-30,	too,	0.14

College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College College Colleg

D-7 LANDFILL GEOFHYSICAL SURVEY Magnetometer and EM Data

X	Υ	MAG	ΕM
0,	o,	51794	0.43
٥,	2ô,	51804	), 44
ο,	40,	51908	0.45
ં,	5Õ,	51817	0 4 1
Ô,	30.	51683	(0.44)
ំរុំ	100.	51744	(1. 4년) 1. 4년
ै,	120	51823	).46
ं , ं ,	140,	51838	0.36
** <b>*</b> ****	i da Cola	51830	
Ŏ.	180.		્રે. કેફ ક ક
en a Oraș	200,	51885	0.43
ó,	200,	51798	)u
0,	•	51359	0.42
), ),	240,	51796	0.33
	260,	51860	0.35
o, o,	290,	51474	0.33
	310,	51620	0.33
0,	330,	51194	0.38
0,	350,	50870	0.4%
0,	370,	52349	O. W.
્,	370,	52947	0.41
ودِ	410,	52278	0,40
2,	430,	51769	O,AÇ
્,	450,	51858	0.43
0,	470,	51831	0.44
਼,	490,	51829	0.48
٥,	510,	51300	0.4∃
9,	530,	51.846	0.50
50,	۰,	51866	0. 50
50,	20,,	51870	ા. 55
50,	40,	51885	0.30
SC,	60,	51901	0,35
50,	80,	51967	0.50
50,	100,	51858	0.75
50,	120,	51868	0.59
50,	140,	51864	1.0
50,	160,	51861	1.15
30,	180,	51851	1.35
50,	200,	51854	1.50
ಡ್ಲ.	220,	51836	35
50,	240,	51854	1.2
50,	260,	51857	1.05
চে,	280,	51848	1. Orb
50,	300,	51840	1.45
50,	320,	51816	1.00
50,	340,	51764	0.93
50,	360,	51649	0.85
50,	380,	516 <b>88</b>	0.70
50,	400,	51a72	0.5€
50,	420,	51596	0.52
	•		

D-7 LANDFILL GEOFHYSICAL SURVEY Magnetometer and EM Data (cont.)

X	Υ .	MAG	EM
50,	440,	51823	0.49
50,	460,	51836	0.50
50,	480,	51995	0.31
50,	500,	51852	0.52
50,	520,	51854	ା. 48
કેં,	530,	51859	0.48
100,	o, <sup>*</sup>	5:393	0.58
100,	2Ó,	52051	0.51
100.	40,	51784	0.57
100,	·26	51512	J.3E
100,	50 <b>,</b>	51779	0.80
100,	80,	51812	0.53
100,	100,	51338	0.70
100,	120,	51336	<b>∴.</b> 80
100,	140,	51847	1.40
100,	160,	51353	1.25
100,	180,	51858	).70
100,	200,	51359	4 7 - 1
100 ,	220,	년 : 연결A	1 - 34
100,	240,	51575	1 . 표준
100,	240,	51844	1.75
100,	280,	51522	2 💔
100,	300,	52074	1.30
100,	320,	51829	1.60
100,	340,	5:803	1.70
100,	340,	52120	8≎
$100_{2}$ .	380,	52029	2.00
100,	400,	51769	1.50
100,	420,	51793	1.30
100,	440,	51769	1.20
100,	460,	51626	ေ.ဒ
100,	480,	52024	0.50
100,	500,	51389	0.62
100,	520,	51870	0.70
100,	<b>5</b> 30,	5:875	0.75
150,	530,	51843	୍ ୫୫
150,	520,	51858	0.75
150,	500,	51809	0.80
150,	480,	51892 -107/	1.00 1.05
150,	460,	51 <b>3</b> 34	1.00 1.00
150,	440,	51683	<b>↓</b> , ∪ ♦ , ₹
150,	420,	51 <b>8</b> 77 52254	0.30
iSQ.	400, 7 <b>9</b> 0	51626	(.10
150,	3 <b>8</b> 0,	51930	0.80
150,	3 <b>60,</b> 340,	5:891	0.75
150,	340. 320.	51841 51868	1,00
150, 150	300,	51872	1.10
150, 150,	280,	51375	1.10
150.	250.	51870	- 1
A switzi e	<i>೭೮</i> ೪ (	010/0	

D-7 LANDFILL GEOPHYSICAL SURVEY Magnetometer and EM Data (cont.)

Х	Y	MAG	EM
150,	240,	51873	1.35
130,	220,	51870	1.15
150,	200,	51862	0.90
130,	180,	51847	ે. <b>૩</b> ૦
150,	150,	51793	0.75
130,	140,	51727	0.57
150,	120,	51703	0.50
150,	100,	<b>51</b> 976	0.40
150,	80.	51982	0.48
iso,	50,°	52310	0.42
150,	40,	51754	Õ, JĒ
130,	20,	51878	51
150,	-2ó,	51784	0.80
200,	0,	51957	0.54
200,	zó,	51376	0.44
200,	40,	51948	0.39
200,	<u>خ</u> ن م	51937	0.35
200,	GO,	51755	0.32
200,	100,	51885	0.24
200,	120,	51956	).5I
200,	140,	51911	0,26
200.	140,	51981	0.52
200	180,	51878	0.70
200,	200,	. 51580	0.85
200,	220,	51884	1.00
200,	240,	51684	0.75
200,	260,	51782	0.90
200,	280,	51884	0.75
200,	300,	51284	೦.7೦
200,	320,	51835	0.70
200,	340,	31880	0.36
200,	350,	51678	ಂ.ತಂ
200,	380,	51869	0.85
200,	400,	51250	0.54
200,	420,	52465	0.75
200,	440,	<b>5</b> 1878	0.70
200,	460,	51397	0.70
200,	4 <b>3</b> 0,	<b>51</b> 980	ં.હેક
200,	500,	51644	ు.పొం
200,	520,	51399	0.74
200,	530,	51977	0.70
250,	<b>5</b> 00,	21818	0.85
250,	480,	51966	0.50
250,	460,	51876	0.90
250,	440,	51976	0.50
250,	420,	51884	୍. ଞ୍ଚ
250, 050	400,	51878	0.30
250, 250	38°,	51884	0.65 0.55
250, 250,	360, 710	51887	0.70
, لائت	Z40,	51890	0.70

D-7 LANDFILL GEOPHYSICAL SURVEY Magnetometer and EM Data (cont.)

X	Y	MAG	EM
250,	320,	51887	0.30
250,	300,	51885	ં.a5
250,	280,	51679	0.95
250,	250,	51895	1.10
250,	240.	51892	1.25
250,	220,	51371	0.75
250.	200.	51870	0.70
250,	180,	51891	0.57
250,	160,	51893	0.47
25°,	140,	51922	0.46
250,	120,	51697	0.43
250,	100,	51892	0.44
250,	80,	51895	0.44
250,	60,	51898	v.≀⊤ v.≀8
250,	40,	51911	0.4∪
250,	20,	51921	0.38
250,	Ö,	<b>5190</b> 7	0.44
300,	ં,	5:893	্. কুল ্. <u>ই</u> ছ
300,	ŽÔ,	51877	0.35
300,	40,	31873	୍. 4 ୬
300,	40,	51671	0.40
300,	a∵,	51881	0.38
300,	100,	51697	0.35
300,	. i20,	51883	0.38
300,	140,	51883	J.38
300,	160,	51390	0.40
300,	180,	21888	0.40
300,	200,	51896	.42
300,	220,	51873	0.42
300,	240,	51872	0.42
300,	250,	51879	J. ∓3
300,	230,	31885	C.44
300,	300,	51686	். 43
300,	320,	51687	ં.5ઢ
300,	340,	51884	0.40
300,	360,	51657	0.56
300,	380,	51874	i.5s
300,	400,	51884	0.50
300,	420,	51891	0.57
300,	440,	51889	0.61
500,	460,	51886	0.34
300°,	480,	51886	ి. ఉప
300,	500,	51886	0.5€
300,	520,	51876	0.70
300,	<b>5</b> 30,	51679	0.71
•	•		

APPENDIX J

REFERENCES

#### REFERENCES

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BIOGRAPHIES

STATEMENT STATEMENT PROPERTY PARABLEMENT PROPERTY DESCRIPTION

#### **EDUCATION:**

B.S., Geology, Waynesburg College

#### **EXPERIENCE:**

With 20 years' experience as a hydrogeologist, Mr. Benner has extensive background in evaluating water resources throughout the United States. A Certified Professional Geologist (CPG), American Institute of Professional Geologists, he has been E & E project manager for a variety of geologic and groundwater evaluations.

Mr. Benner has directed and performed 42 preliminary assessments/site inspections, 12 projects involving development and implementation of groundwater monitoring activities and subcontractor acquisition and oversight; 15 investigations involving ground- and surface water and soil sampling; and 14 projects requiring the planning for and application of various geophysical survey techniques to delineate the extent of contamination. He is responsible for coordinating E & E's Dallas office geophysical equipment logistics and procedures and has developed standard operating procedures for geophysical exploration surveys that currently are being used throughout the United States. Benner planned and managed E & E's remedial investigation for the Gurley Pits hazardous waste site, including an extensive site background study, multimedia sampling, geophysical surveys to identify off-site contaminated areas, and soil boring and groundwater monitoring. For E & E's extensive geophysical surveys of the IWC hazardous waste site in Fort Smith, Arkansas, he managed the remote-sensing surveys to identify waste disposal areas, define potential subsurface contaminant migration pathways, and provide predrilling safety clearance; provided expert geotechnical support for the development of the seismic refraction investigation; and conducted a magnetometer survey to provide safety clearance for the drilling operations. He also has developed and conducted classroom and field training programs in the application, performance, and interpretation of geophysical surveys.

He was E & E's site manager for a groundwater contamination study at a fiber plant in Odenton, Maryland, and for groundwater contamination monitoring programs at three sites in lowa and at sites in New York and Pennsylvania. He conducted hydrogeological studies at the National Wood Preservers federal Superfund site in Haverford Township, Pennsylvania. At the McClintic Wildlife Refuge in West Virginia, he investigated the extent of subsurface contamination by DNT and ordnance manufacturing process waste; mapped the locations of wells, wastewater pipelines, and manholes; and determined the locations for core borings and monitoring wells. Mr. Benner also designed and supervised the installation of groundwater monitoring systems for waste site investigations in Rochester, New York.

B.S., Biology, Texas Christian University

### **EXPERIENCE:**

Mr. Park recently conducted sampling and surveying on two low-level radioactive waste sites: Fansteel Metals in Muskogee, Oklahoma; and Kerr McGee in Cusking, Oklahoma. He also is in charge of drum disposal for hazardous waste site investigation-derived waste generated by E & E Dallas operations.

In addition, during his two years as a team member for E & E investigations of hazardous waste sites, Mr. Park has performed extensive background data searches and participated in preliminary assessments, site inspections, and full-field investigations; collected samples of biota, soil, sediment, groundwater, and surface water; and monitored the activities of site contractors to ensure their compliance with client specifications. In addition, he has assisted in the development of site safety plans and assessed the impacts of hazardous and toxic materials on the vegetation and aquatic life surrounding contaminated areas. He has participated in the preparation of cost estimates for site cleanup and remedial activities.

Mr. Park has performed environmental sampling of soils and water, conducted air characterizations, and low-level radioactive materials sampling at several sites located in Texas and Oklahoma. He has also done air monitoring work for an asbestos abatement program.

B.S., Chemistry/Biology, East Texas State University

#### **EXPERIENCE:**

For E & E investigations of hazardous waste sites, Mr. Smith conducts multimedia environmental sampling, soil gas surveys, ambient air monitoring, and contractor monitoring for cost-effectiveness and work plan compliance. He interprets the results of field and laboratory analyses to characterize on-site contaminants, define the magnitude and extent of contamination, and assist in the development of appropriate mitigative measures.

During one year as a chemist with an environmental research laboratory in Dallas, Texas, Mr. Smith conducted metal analyses and drugscreening assignments.

He has several years' experience as an instructor of chemistry and as a university research assistant involved in microbiological research.

As a member of the Field Investigation Team working under the USEPA, Mr. Smith performed environmental sampling, conducted air quality characterizations, and performed routine field analytical tests on soil and water samples at several sites including four industrial waste sites located in New Mexico, Oklahoma, and Arkansas, and a land-fill near Dallas, Texas. He served as field chemist for investigations at two radiation sites in Oklahoma.

In addition to his field-related duties, Mr. Smith is responsible for review of analytical data and technical report preparation. In this capacity, he has completed projects involving investigations at various industrial facilities, landfills, and abandoned waste sites in Texas, Oklahoma, Arkansas, and Louisiana.



B.S., Chemical Engineering, University of Rochester

#### **EXPERIENCE:**

Mr. Brodzik applies his chemical engineering expertise to E & E investigations and remediation of hazardous waste sites. He participates in preliminary assessments and full-field investigations; plans and conducts environmental sampling of soils, leachate, groundwater, and surface water; and takes part in the design, siting, and installation of groundwater monitoring-well systems. He evaluates the results of laboratory analyses in order to determine the nature, origin, and extent of contamination. He also provides chemical engineering support for the design and evaluation of appropriate feasible remedial measures and remedial action plans to contain, control, and clean up hazardous substances; and he monitors the activities of on-site remedial contractors.

His extensive participation in the planning stages of E & E's work at the Bridgeport Rental and Oil Services federal Superfund site included design of sampling plans and the quality assurance management plan. His responsibilities for this project also have included on-site sampling, data analysis, and remedial design of site incineration and wastewater treatment options. He also has determined subcontracting requirements to provide specifications for waste removal.

Mr. Brodzik has conducted environmental audits at chemical and fertilizer manufacturing facilities in Mexico, Costa Rica, Colombia, and Brazil. To complete the audits, he evaluated each plant's chemical handling, use, and storage procedures and waste production quantities in order to determine the environmental contamination potential. He interviewed plant personnel, local contractors, and government officials and assisted in developing work plans for groundwater studies. For the City of Rochester, New York, Mr. Brodzik developed an evaluation program to be used for the siting of a new industrial complex.

As a product assurance engineer for the United States Army Armament Research and Development Center in New Jersey, Mr. Brodzik provided extensive production and field support for on-site evaluations, development of test plans for suspect munitions, coordination of program development, scheduling and monitoring of program milestones, evaluation of test program data, and provision of recommendations concerning stockpile disposition.



M.S., Environmental Science (Health), George Washington University B.S., Chemistry, Carnegie-Mellon University

#### **EXPERIENCE:**

With 18 years' experience in toxicology, chemistry, and the interpretation of pertinent federal and state regulations, Mr. Weinstein specializes in toxicological risk and endangerment assessment. For E & E investigations of hazardous waste sites, he interprets data concerning chemical characteristics, migration routes, and concentrations to determine exposure media, the human population at risk and potential impacts on sensitive environmental receptors.

For the Sapp Battery federal Superfund site in Florida, Mr. Weinstein conducted a comprehensive multimedia human health and environmental risk assessment for lead and other heavy metals to evaluate potential exposure to the public and to aquatic life. Human exposure routes evaluated included ingestion and inhalation of contaminated soil particles and ingestion of contaminated drinking water and fish. Based on the assessment, Mr. Weinstein developed media-specific cleanup criteria that were used for the selection, screening, and design of remedial alternatives for the site. Mr. Weinstein also has performed risk assessments for the remediation of human health risks posed by dioxins, polychlorinated biphenyls, and other chemicals at the Hyde Park, New York, federal Superfund site.

Mr. Weinstein worked for five years as an industrial hygienist with the Occupationa' Health and Safety Administration (OSHA) in Washington, DC. As project manager responsible for the development and promulgation of regulations designed to protect workers exposed to carcinogens, he critically evaluated toxicological and epidemiological studies assessing the toxic effects and associated risks of chemicals on humans; and wrote technical analyses representing OSHA determinations concerning the severity of health hazards, feasibility of control technology for reducing exposures, and derivation of the maximum permissible exposure limits.



As a toxicologist in Cambridge, Massachusetts, for two years Mr. Weinstein assisted in the assessment of human health risks associated with multimedia control strategies for six widely used chlorinated solvents (carbon tetrachloride, trichloroethylene, perchloroethylene, methylene chloride, 1,1,1-trichloroethane, and CFC-113). He analyzed toxicological effects, sources, and quantities of each solvent emitted; as well as intermedia transfers, ultimate fate, environmental risk, and human exposure factors. He was the manager and senior author for the preparation of two documents summarizing available data concerning environmental releases of 97 chemicals to air, water, and land.

B.S., Chemistry, cum laude, University of Sussex, Great Britain

#### **EXPERIENCE:**

As director of E & E's Analytical Services Center (ASC), Mr. Clifton has overall responsibility for the facility's operation as a multifunctional, high-quality environmental laboratory. He directs a staff of over 30 professional chemists and ensures that the laboratory quality assurance/quality control (QA/QC) program, laboratory and field sample chain-of-custody documentation and reporting procedures, and laboratory safety protocol are continually reviewed to incorporate the most current methodologies.

Mr. Clifton was instrumental in attaining the ASC's certification for the United States Environmental Protection Agency Contract Laboratory Program for the organic analysis of Superfund site samples. For this contract, Mr. Clifton is responsible for maintaining the ASC's state-of-the-art capabilities in gas chromatograph/mass spectrometer (GC/MS) and GC/electron capture detection instrumentation, and for insuring that the laboratory produces data that will withstand scrutiny in administrative and judicial proceedings.

With 18 years' experience as an analytical chemist, Mr. Clifton has managed and performed analyses of environmental samples for routine indicators of pollution as well as for specific pollutants such as pesticides, polychlorinated biphenyls and other toxic organics, and heavy metals. He was the manager of the environmental and analytical laboratory operated by E & E for the Royal Commission for Jubail and Yanbu at Madinat Yanbu Al-Sinaiyah, Saudi Arabia, where he was responsible for the analysis of seawater, groundwater, sanitary and industrial wastewater, and drinking water using atomic absorption, autoanalysis, gas chromatography/mass spectrometry, and classical laboratory techniques.

After earning his degree in chemistry, Mr. Clifton worked in marine research with the University College of Swansea (Wales, Great Britain) Oceanography Department, developing methods for trace metal analysis. In particular, he developed and implemented a method for detecting mercury in seawater, sediments, and animal tissue, using atomic absorption and atomic fluorescence spectrophotometry. His studies were published in British scientific journals. Working with a municipal authority in Brighton, England, he used autoanalysis, gas chromatography, atomic absorption, and fluorescence spectroscopy to analyze samples of river water, seawater, groundwater, and sewage for a spectrum of possible pollutants, including bacteria and trace metals.

EXECUTAGE AND PROPERTY DESCRIPTION OF THE PROPERTY.



- M.S., Environmental Engineering, Polytechnical University of Warsaw, Poland
- B.S., Civil Engineering, State University of New York at Buffalo

#### **EXPERIENCE:**

Mr. Marszalkowski has been a hazardous and toxic substance project manager with E & E for three years. He is presently program technical coordinator for E & E's work in support of the United States Air Force Installation Restoration Program, at various installations nationwide. In particular, Mr. Marszalkowski manages the presurvey and survey activities, including the preparation of work plans and detailed cost estimates for multiple-site remedial investigations (RIs). In other project management assignments for which he was responsible for logistics, timeliness, and technical quality, Mr. Marszalkowski led special investigations in Oregon at five suspected hazardous waste sites, including three municipal/industrial landfills, a munitions factory, and a wood-preserving chemical plant.

Mr. Marszalkowski held responsibility for the development of sampling specifications and estimation of manpower schedules, equipment, and associated costs for waste tank sampling, analysis, decontamination, removal, and disposal at the Bridgeport Rental and Oil Services National Priorities List (NPL) site in New Jersey, which involves the single largest Superfund allocation to date (over \$55 million). He assisted in delineating the complex groundwater situation that exists beneath the site (i.e., three separate groundwater zones with areas of verticle migration between the upper and middle zone and the middle and deep zone); helped define potential contaminant migration pathways; and used this information to resolve engineering questions related to the design of the most appropriate remedial measures.

Mr. Marszalkowski designed remedial action strategies, completed a detailed feasibility evaluation of alternatives, and provided environmental engineering input to the preparation of a community relations presentation describing the selected remedial alternative for the Whitehouse Oil Pits NPL site. He was project manager for RI support activities conducted for the Commonwealth of Pennsylvania at the Welsh Road hazardous waste site, for which he wrote the remedial action master plan and work plan. He also assisted in the engineering review of remedial action plans during E & E's extensive investigative work at the Hyde Park NPL site in Niagara Falls, New York.

### APPENDIX L

OVERVIEW OF RISK ASSESSMENT AND THE DEVELOPMENT OF STANDARDS AND CRITERIA

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#### L.1 INTRODUCTION

This appendix discusses development of standards and criteria used in the evaluation of concentration data of chemicals in soils and groundwater and surface water at or associated with the Reese Air Force Base.

As a first step in identifying criteria, E & E has prepared brief one- or two-page toxicological profiles for contaminants of potential concern defined as those reported in groundwater samples above levels of detection and the subject of at least one of the following drinking water standards or criteria: EPA primary drinking water standards or EPA Health Advisories. These profiles, found in Appendix M of this report, present short overviews of the toxicological effects. In addition, based upon the relevant potential route of human exposure (oral) and exposure medium (drinking water) the profiles also provide background on the applicable federal drinking water standards and criteria for each chemical.

The following sections present an overview of risk assessment and development of drinking water standards and criteria.

Section L.2 presents an overview of risk assessment and criteria used by the Environmental Protection Agency to categorize each of the chemicals as carcinogens and noncarcinogens. The section places emphasis on the categorization scheme, as whether a chemical ought to be a regulated carcinogen or not is usually the dominant factor resulting typically in orders of magnitude differences in human exposure levels concentrations currently estimated by federal and state agencies to present acceptable levels of risks.

Section L.3 describes the methodologies used to estimate risks for carcinogens and noncarcinogens.

Section L.4 summarizes drinking water standards and criteria, for the 12 contaminants of potential concern.

### L.2 CLASSIFICATION OF CHEMICALS AS CARCINOGENS OR NONCARCINOGENS

Based on significantly different theories on the shape of doseresponse curves resulting in significantly different risk estimates, chemicals are often divided, for risk assessment purposes, into two categories--carcinogens and noncarcinogens. Risk assessment for carcinogens is based on the concept that any exposure to a carcinogen may present a finite risk of cancer to man. Risk assessment for non-carcinogenic effects is based on the concept that there is a threshold exposure level below which adverse health consequences are not expected to occur. The term <u>carcinogen</u> means any chemical for which there is sufficient evidence that exposure may result in continuing uncontrolled cell division (cancer) in humans and/or animals. By the process of elimination, <u>noncarcinogen</u> is taken to mean any chemical for which the data are either negative or are insufficient to evaluate potential carcinogenicity. These definitions are not static. Rather, at any time, additional data may become available which shift the weight-of-evidence so that a noncarcinogen must be reclassified as a carcinogen, or alternatively a carcinogen as a noncarcinogen.

In this report, chemicals have been classified as carcinogens or noncarcinogens based on EPA weight-of-evidence criteria which take into account the quality and adequacy of the experimental data and kinds of responses induced by a suspect carcinogen (51 FR 33992, September 24, 1986). Table L-1 summarizes the five EPA weight-of-evidence categories in current use.

According to these EPA guidelines, chemicals in the first two groups--A or B ( $B_1$  or  $B_2$ )--are considered to have sufficient evidence to be considered "human carcinogens" or "probable human carcinogens," and can be the subject of nonthreshold carcinogenic risk estimation procedures. Chemicals in group C, "possible human carcinogens," may or may not be subject to carcinogenic risk estimation procedures depending upon the quality of the data. The remaining chemicals--in groups D or E--are considered to be noncarcinogens and are subjected to standard threshold-based toxicological risk estimation procedures for noncarcinogenic end points.

Carcinogen classifications for all 11 of the contaminants have been based directly on EPA determinations. Table L-2 summarizes the classification of the 12 contaminants.

For more details concerning the categorization of any individual contaminant, refer to the respective profile in Appendix M.

Table L-1

FIVE EPA CATEGORIES FOR EVALUATING THE EVIDENCE OF CHEMICAL CARCINOGENICITY

Group	Description
Group A	Human Carcinogen – sufficient evidence from epidemiological studies
Group B	Probable Human Carcinogen -
Group B <sub>1</sub>	<ul> <li>At least limited evidence of carcinogenicity to humans</li> </ul>
Group B <sub>2</sub>	<ul> <li>Usually a combination of sufficient evidence for animals and inadequate data for humans</li> </ul>
Group C	Possible Human Carcinogen – limited evidence of carcino- genicity in animals in the absence of human data
Group D	Not Classifiable - inadequate human and animal evidence of carcinogenicity
Group E	Evidence of Noncarcinogenicity for Humans - no evidence of carcinogenicity in at least two adequate animal tests in different species or in both adequate epidemiological and animal studies

Source: EPA 1986.



Table L-2

CARCINOGENICITY CLASSIFICATION OF CHEMICALS ACCORDING TO EPA WEIGHT-OF-EVIDENCE CRITERIA 1

Chemical C	EPA lassification	Basis
Arsenic	A <sup>3</sup>	Human carcinogen based upon epidemiological studies; pending resolution of essentiality in human diet; EPA has not regulated arsenic as a carcinogen in drinking water
Cadmium	81 <sup>3</sup>	Probable human carcinogen based upon sufficient evidence in epidemiological studies; not regulated as a carcinogen in drinking water because there is insufficient evidence by the oral route
Chromium	A <sup>3</sup>	Sufficient evidence for $\text{Cr}(\text{VI})$ in humans and animals by inhalation route; EPA has not regulated chromium as a carcinogen in drinking water due to insufficient evidence by the oral route
Copper	D <sup>3</sup>	Inadequate data to classify
Cyanides	D3	Inadequate data to classify
Dichlorobenzenes	D2,3	Inadequate data to classify
Dichloromethane (Methylene Chloride)	B2 <sup>4</sup>	Carcinogenic in animal studies
Lead	B <sub>2</sub> <sup>3</sup>	Carcinogenic in animal studies; because of the extensive negative epidemiological evidence, EPA has proposed to regulate lead in drinking water based on noncarcinogenic effects.
Toluene	$D^3$	Inadequate data to classify
Tetrachloroethene	В <sub>2</sub> <sup>5</sup>	Carcinogenic in animal studies
1,1,1-Trichloroethan	e D <sup>3</sup>	Inadequate data to classify
Trichloroethene	B <sub>2</sub> <sup>2</sup>	Carcinogenic in animal studies

### Footnotes:

- <sup>1</sup> EPA (1986a).
- <sup>2</sup> EPA (1985b).
- <sup>3</sup> EPA (1985c).
- 4 EPA (1985f).
- <sup>5</sup> EPA (1985h).

#### L.3 RISK ASSFSSMENT PROCEDURES FOR CARCINOGENS AND NONCARCINOGENS

In contrast to noncarcinogenic effects for which thresholds are thought to occur, scientists have been unable to demonstrate experimentally a threshold for carcinogenic effects. This has led to the assumption by federal regulatory agencies (e.g., EPA, FDA, and OSHA) that since a threshold dose cannot be demonstrated, it should be assumed, based on conservative (health-protective) grounds, that any exposure to a carcinogen theoretically represents some finite risk to man. Depending on the potency of a specific carcinogen, such a risk would be vanishing small.

Scientists have developed several mathematical models to estimate low-dose carcinogenic risks from observed high-dose risks. Consistent with current theories of carcinogenesis, the EPA has selected the linearized multistage model based on prudent public health policy (51 FR 33992-34002, September 24, 1986). In addition to using the linearized multistage model, EPA uses the 95% upper confidence limit for doses or concentrations in animal or human studies to estimate low-dose unit cancer risk (UCR) or potency. By using these procedures, the agency believes it would be unlikely to underestimate the actual potency, thus making it correspondingly unlikely that it will underestimate the potential carcinogenic risks to humans.

Noncarcinogenic effects (e.g., skin irritation, birth defects, immunological effects, organ damage, etc.) are generally regarded to occur only above a minimum dose or threshold. Consequently, risk assessments for a chemical designated as a noncarcinogen attempt to derive an acceptable daily intake (ADI) or risk reference dose (RRfD) for exposure in humans based on its No-Observed-Adverse-Effect-Level (NOAEL) or No-Observed-Effect-Level (NOEL). In the absence of a suitable NOAEL or NOEL, the ADI may be based on a Lowest-Observed-Adverse-Effect-Level (LOAEL) or Lowest-Observed-Effect-Level (LOEL). Because the NOELs and NOAELs are usually determined by laboratory experiments in animals conducted at high doses to provide an added margin of safety, estimation of ADIs require the use of uncertainty factors to compensate for data limitations and the lack of precision in extrapolating from high doses in animals to lower doses in humans. Five uncertainty factors used by EPA are summarized in Table L-3 (EPA 1985c).

Table L-3

UNCERTAINTY FACTORS USED IN THE DERIVATION OF ACCEPTABLE DAILY INTAKES

Uncertainty Factor	Condition of Use
10	A 10-fold uncertainty factor is used with valid experimental results on appropriate durations of exposures of humans.
100	A 100-fold uncertainty factor is used when human data are not available, and extrapolation is made from valid results of long-term animal studies.
1,000	A 1,000-fold uncertainty factor is used when human data are not available and extrapolation is made from animal studies of less than chronic exposure.
1-10	An additional uncertainty factor from 1 to 10 when using a lowest-observed-adverse-effect-level (LOAEL) instead of a no-observed-adverse-effect-level (NOAEL).
Intermediate uncertainty factor	Other uncertainty factor used, according to scientific judgment, when justified.

Source: EPA 1985b.

ADIs are generally calculated using the formula:

ADI (in mg/kg/day) = 
$$\frac{NOAEL \text{ in mg/kg/day}}{Uncertainty Factor}$$
 (2)

AADIS (adjusted ADIS for estimated drinking water intake) used by EPA in the derivation of maximum contaminant limits (MCLS) for drinking water are calculated, with few exceptions, based on exposures to adults. AADIS are calculated by multiplying the ADI by 70 kilograms (kg), the assumed weight for an adult, and dividing by 2 liters per day, the assumed amount of water consumed by an adult per day.

$$AADI = \frac{(NOAEL) (70 \text{ kg})}{(Uncertainty Factor) (2 liters/day)}$$
(3)

ADIs and AADIs should not be regarded as providing the exact dividing line between "safe" (below the ADI) and "unsafe" (above the ADI) doses or exposure levels. This conclusion would be equivalent to the interpretation that "risks" abruptly disappear at a specific dose for all members of the human population. In fact, for some chemicals, risks may rise rapidly through and above the ADI, presenting significant risks to humans. For others, doses well above the ADI may fall in the low or zero risk category. Consequently, although ADIs may be used in standards development and risk assessment, they do not represent sharp divisions in the continuum of dose-risk relations (Rodricks and Tardiff, 1984).

Due to the imprecision in the ADI approach, there is currently considerable research designed to quantify a variety of factors contributing to uncertainty thus improving levels of precision in estimating ADIs for specific chemicals. Factors currently subject to investigation include uncertainties related to the slope of dose-response curves, sample size of animals treated, and variability of human responses. However, in the interim period until these approaches can be validated, the current ADI approach remains the method of choice by EPA in the development of drinking water standards.

#### L.4 DRINKING WATER STANDARDS AND CRITERIA

Four sets of drinking water standards or criteria are relevant to the evaluation of potential groundwater contamination at Reese Air Force Base:

- EPA enforceable maximum contaminant limits (MCLs), nonmandatory proposed MCLs, or non-mandatory proposed or final recommended MCLs (RMCLs);
- EPA non-mandatory Health Advisories (HAs);
- National Academy of Sciences (NAS) Suggested-No-Adverse-Response Levels (SNARLS); and
- EPA recommended ambient water quality criteria for the protection of human health.

This section discusses each of these in turn, followed by a summary table of the values for each of the chemicals of concern.

Depending upon the stage of rulemaking, EPA may have issued final MCLs, proposed MCLs, final RMCLs or proposed RMCLs for an individual chemical. Proposed and final RMCLs are nonenforceable health goals issued during the first stages of rulemaking. Proposed and final RMCLs are set at 0 for substances evaluated as probable human carcinogens (Group A or B) according to EPA weight-of-evidence carcinogenicity criteria. For chemicals falling in other categories, RMCLs are set based upon chronic toxicity, or in the absence of suitable chronic data, non-chronic data using the ADI threshold-based approach reviewed in the previous section. Proposed and final MCLs are established as close to RMCLs as feasible taking into account cost, availability of treatment technology, and analytical methods (EPA 1985b).

The second, EPA drinking water Health Advisories (HAs), have been developed from data describing noncarcinogenic end points of toxicity, using the AADI approach described in Section L.2. They do not incorporate quantitatively any potential carcinogenic risk from exposure. Consequently, for chemicals classified as carcinogens, the HAs should be applied only to assess non-chronic toxicity end points with the

understanding that carcinogenicity must be addressed separately. HAs for adults are developed using the ADI approach assuming a standard 70 kilogram weight and drinking water consumption of 2 liters per day. Derivation HAs for children assume a standard 10 kilogram weight and 1 liter per day drinking water consumption. For those chemicals which are classified as human or probable human carcinogens based upon carcinogen risk assessment Agency weight-of-evidence carcinogenicity criteria, non-zero one-day, ten-day, and longer-term HAs may be derived, with attendant caveats. However, EPA has not developed and does not recommend using HAs for lifetime (chronic) exposures to carcinogens.

The third, NAS SNARLs are based on noncarcinogenic end points based upon the ADI approach described in Section L.2. SNARLs may be set for any exposure duration. Typically, NAS has developed one-day, seven-day or chronic SNARLs.

The final set, EPA ambient water quality criteria, have been derived, as appropriate, for carcinogenic or noncarcinogenic end points. For noncarcinogens criteria have been based upon the ADI approach. EPA developed the criteria for carcinogens using linear or linearized multistage models to estimate drinking water levels corresponding to excess lifetime cancer risk estimates derived assuming lifetime consumption of drinking water (21/day) and aquatic species (6.5 g fish and shellfish per day) taken from waters containing the corresponding contaminant concentration. For the most part, these ambient water quality criteria were developed prior to and published in 1980 (EPA 1980). In the intervening years, EPA has revised its conclusions not only qualitatively as to the hazards presented, but also quantitatively as to the risks associated with chemical exposures and requisite levels of protection. Consequently, they should only be used where not superseded by drinking water standards, or by EPA health advisories.

Table L-4 summarizes the drinking water standards and criteria for the chemical contaminants of potential concern.

Table L-4 Drinking water Standards and Criteria (ug/L)

	EPA Drink	ing Water Standards	er Stand	lards		EPA Healt	EPA Health Advisories		EPA Ambie Quality	EPA Ambient Water Quality Criteria
Chemical	MCL	PMCL	RMCL	PRMCL	1-Day	10-Day	Longer Term	Lifetime	Non Cancer	Cancer
Arsenic	50	+	;	50	50	\$0	50	50	1	2.2 ng/L
Cadmi um	<b>D</b>	1	1	5	43 (child) 150 (adult)	8 (child) 29 (adult)	1	۰	1	
Ch rom i um	50	1	1	120	<b>;</b>	1,400 (child) 5,000 (adult)	240 (child) 840 (adult)	120	50 [Cr(VI)] 170,000 [CR(III)]	1 1
Cyanides	1	i	1	;	220 (chi 1d)	220 (chi 1d)	750 (adult)	750	1	1
Copper	1,000 (secondary standard)	;	;	1,300	1,300 (child) 1,300 (adult)	1	1		1,000	1
<u>Dichlorobenzenes</u> o-Dichlorobenzene (1,2-Dichlorobenzene)	1	;	1	620	; ;	;	8,930 (child) 31,250 (adult)	620	400 (total all isomers)	I
m-Dichlorobenzene (1,3-Dichlorobenzene)	•	1	!	1	1 1	1 1	10,700 (child) 37,750 (adult)	750	400 (total all isomers)	1
p-Dichlorobenzene (1,4-Dichlorobenzene)	1	750	750	;	;	1	740 (child) 2,600 (adult)	+	400 (total all isomers)	1

lable L-4 (Cont.)

-	EPA Drinking Water Standards	ng Wate	r Stand	ards		EPA Health	EPA Health Advisories		EPA Ambient Water Quality Criteria	nt Water Criteria
Chemical	MCL	PMCL	RMCL	PRMCL	1-Day	10-Day	Longer lerm Lifetime	Lifetime	Non Cancer	Cancer
Dichloromethane (Methylene Chloride)		;	•	1	13,300 (child)	1,500 (child)	į.	350	1	1
Lead	20	;	;	20	{	:	;	20	S	<b>,</b>
letrachloroethene	;	1	1	1	<b>{</b>	34,000 (child)	1,940 (child) 6,800 (adult)	089	I	0.8
loluene	;	;	1	2,600	18,000 (child) 63,000 (adult)	6,000 (child) 21,000 (adult)	111	2,000	14,300	í
1,1,1-1richloroethene	;	200	200	1	14,000 (child)	1 1	35,000 (child) 125,000 (adult)	200	18,700	•
Trichloroethene	;	2	0	;	;	<b>!</b>	ŀ	260	6,770	<b>'</b>
Zinc	5 mg/L (secondary standard)	-	1	1	•	;	:	;	-	[

# APPENDIX M

TOXICOLOGICAL PROFILES FOR POTENTIAL CONTAMINANTS OF CONCERN IN GROUNDWATER AND SURFACE WATER

#### M.1 ARSENIC

#### Noncarcinogenic Effects

At high doses, arsenic compounds have been shown to produce acute and chronic toxic effects which include irreversible systemic damage. The trivalent compounds are the most toxic and tend to accumulate in the body. Chronic animal studies have shown that arsenic exposure may cause body weight changes, decreased blood hemoglobin, liver damage, and kidney damage.

There is evidence that arsenic is an essential element enhancing growth and development in certain animal species, and it has been suggested that arsenic may be an essential element for humans (NAS 1980).

Whether arsenic is an essential element, is the subject of continuing research. Teratogenic effects of arsenic compounds at relatively high exposure levels have been demonstrated in a number of animal species (EPA 1984). Generally, these effects have been observed following parenteral (injection) administration; whereas, administration at lower doses by the more relevant oral route has not resulted in any significant reproductive or developmental effects.

#### Mutagenicity and Carcinogenicity

Arsenic has been shown to be mutagenic in several assay systems and to induce chromosomal aberrations in vivo and in vitro. Animal carcinogenicity studies have reported conflicting results. Several studies have reported an increased incidence of bronchiogenic carcinomas in rats exposed intratracheally to an arsenic-containing pesticide. Reasons for the inconsistent findings in animals may include incorrect selection of animal models and use of flawed study designs. In humans, epidemiologic studies and case reports have reported that arsenic is associated with tumors of the skin, lungs, genital organs, and visual organs (EPA 1984b, EPA 1985c).

EPA has classified arsenic in Group A, i.e., a human carcinogen, based on extensive evidence of human carcinogenicity through inhalation and ingestion exposure (EPA 1985c).

#### Drinking Water Standards and Criteria

Standards. The current MCL for arsenic under the National Interim Drinking Water Regulations is 50 ug/l. The NAS Drinking Water Committee has analyzed the toxicology of arsenic (NAS 1983). Based upon this evaluation, NAS recommended the retention of the MCL pending resolution of the question whether arsenic is an essential element in the human diet.

NAS also examined the available epidemiologic studies which were designed to investigate the relationship between arsenic exposure and skin cancer in the United States. The conclusion of the report was that these studies lacked statistical power to determine if arsenic causes skin cancer. However, the report stated that precursors of skin cancer, normally seen in cases of arsenic-induced skin cancer, were not seen in these studies.

Based upon the recommendations of NAS, EPA has proposed that the RMCL remain at the current MCL of 50 ug/l. In its determination, EPA stated that the level was below concentrations at which noncarcinogenic toxicity had been demonstrated and was in the range which might be essential for humans (EPA 1985c).

• Criteria. Based upon recommendations of NAS, EPA has proposed that all health advisories for arsenic be set at 50 ug/l (EPA 1985d). NAS has not developed SNARLs for arsenic. The EPA ambient water quality criteria for the protection of human health is 22 ng/l, corresponding to 1 x 10<sup>-5</sup> lifetime excess cancer risk calculated on the basis of an epidemiological study of skin cancer among Taiwanese exposed via drinking water (EPA 1980).

## Non-Carcinogenic Effects

Acute and chronic exposure to cadmium in animals and humans results in renal dysfunction, hypertension, anemia, and altered liver microsomal activity. The kidney is considered to be the critical target organ in humans chronically exposed to cadmium by ingestion. The early clinical signs of renal injury include proteinuria, glucosuria, and aminoaciduria.

To calculate an adjusted AADI, EPA used renal dysfunction as an end point, and the most widely accepted estimate for the critical (threshold) concentration of cadmium in the renal cortex, 200 ug/g. Using 4.5% absorption of the daily dose and 0.01% excretion in the total body burden per day, EPA calculated a LOAEL of 352 ug/day for renal effects in humans. Incorporating an uncertainty factor of 10, EPA has developed an acceptable daily intake (ADI) of 35 ug/day. Adjusting the ADI for consumption of 2 liters of water per day, EPA derived a provisional AADI of 18 ug/l (EPA 1985c).

Embryotoxic and teratogenic effects have been demonstrated in many mammalian species following parenteral administration of high doses of cadmium. In contrast, there is little evidence of these effects at lower doses by either of the more relevant inhalation or oral exposure routes (EPA 1981).

#### Carcinogenicity and Mutagenicity

Cadmium chloride aerosol administered by inhalation for 18 months produced lung tumors in rats. In contrast, all cancer bioassays in which cadmium has been administered orally have been negative. Recent epidemiological studies indicated that workers chronically exposed to cadmium are at risk of elevated lung cancer mortality. According to its weight-of-evidence carcinogenicity criteria, EPA has classified cadmium in Group B1 (probable human carcinogen) based on the epidemiological data (EPA 1985c).

While the Agency has concluded that cadmium is a carcinogen by the inhalation route, EPA has proposed that the MCL for cadmium not be set based on carcinogenicity, based upon the negative cancer bioassays in which cadmium was administered orally (EPA 1985c).

#### Drinking Water Standards and Criteria

Standards. The current MCL for cadmium, under the National Interim Primary Drinking Water Regulations, is 10 ug/l. This level was designed to prevent renal dysfunction, and was based on a critical value of cadmium in the kidney cortex of 200 ug/g, and assumptions on gastrointestinal absorption, excretion of the absorbed dose, daily excretion of the total body burden, and daily dietary cadmium intakes.

The World Health Organization (WHO) guideline for drinking water is 5 ug/l. This value was based on a value for provisional tolerable weekly cadmium intake, assuming that 25% of the total cadmium intake was attributable to drinking water. EPA has proposed a RMCL of 5 ug/l based upon the WHO guidelines and the NAS SNARL.

• Criteria. Based on a NOAEL reported in a study of 43 ug/kg/day for emetic effects reported in a study of acute exposure in adult humans, EPA derived 1-day drinking water HAs of 43 ug/l (10-kg child) and 150 ug/l (70-kg adult) (EPA 1985d). These HAs were derived using an uncertainty factor of 10, based on consumption of 1 liter and 2 liters of water per day for a child and adult, respectively.

Ten-day HAs of 8 ug/l (10-kg child) and 29 ug/l (70-kg adult) were calculated based on a NOAEL reported in a chronic 24-week feeding study in rats. In deriving the 10-day HAs, EPA used a NOAEL of 80 ug/kg/day, based on proteinuria, and an uncertainty factor of 1,000.

The lifetime and longer-term HAS for a 70-kg adult, equivalent to the proposed RMCL, are 5 ug/l (EPA 1985d).

The NAS has calculated a chronic SNARL of 5 ug/l using renal dysfunction as an end point, based on a 24-week-feeding study in rats (NAS 1982). This level was derived from the NAS and

WHO guidelines of 5 ug/l by allocating 25% of total human cadmium intake to drinking water (EPA 1985c).

The EPA ambient water quality criterion for the protection of human health for cadmium is 10 ug/l, considering ingestion of water and contaminated aquatic organisms (EPA 1980).

#### M.3 CHROMIUM

#### Noncarcinogenic Effects

There are two chromium valences of principal concern in drinking water - trivalent [Cr(III)] and hexavalent [Cr(VI)] chromium. Cr(VI) is much more toxic than Cr(III) and has been shown to produce liver and kidney damage, internal hemorrhage, and respiratory disorders. EPA has developed an adjusted acceptable daily intake for total chromium based upon effects of Cr(VI) for the following three reasons (EPA 1985c):

- (1) The two valences are in dynamic equilibrium in aqueous media;
- (2) An AADI based upon the more toxic [Cr(VI)] of the two valences will be conservative (health protective); and
- (3) Reduction of Cr(VI) to Cr(III) in the stomach following oral intake is incomplete, and relative to Cr(III), there is greater Cr(VI) absorption and tissue accumulation.

EPA derived the provisional AADI for total chromium based upon a NOAEL reported in a study in which rats were exposed to Cr(VI) in drinking water for one year. Based upon a NOAEL of 2.41 mg/kg/day, an uncertainty factor of 500, and standard intake and physiological assumptions, the Agency derived an AADI of 170 ug/l (EPA 1985c).

# Carcinogenicity and Mutagenicity

Based upon positive epidemiological studies demonstrating excess cancer mortality among Cr(VI)-exposed workers and positive animal

studies, EPA has classified Cr(VI) in Group A - sufficient evidence of carcinogenicity in humans and animals (EPA 1985c). However, since chromium has not been shown to be carcinogenic by the oral route, the Agency has proposed that chromium in drinking water be regulated based upon noncarcinogenic chronic toxicity data (EPA 1985c).

Cr(VI) has demonstrated consistently positive mutagenic activity in a number of bacterial systems. Both Cr(III) and Cr(VI) have been shown to interact with DNA in bacterial assays. Cr(VI) has inhibited DNA synthesis and increased unscheduled DNA synthesis in mammalian cells in culture. Both valences have been demonstrated to produce clastogenic effects in mammalian cells. Increased frequencies of chromosomal aberrations have also been observed in occupationally exposed workers.

#### Drinking Water Standards and Criteria

#### Standards

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The current MCL for chromium in drinking water is 50 ug/l. Based upon the AADI of 170 ug/l derived on the basis of chronic noncarcinogenic toxicological end points in animals, EPA has derived a proposed RMCL of 120 ug/l by factoring in data on human exposure (100 ug/day via the diet, 0 ug/day via the air) (EPA 1985c).

#### Criteria

In the absence of suitable data, EPA has not derived a 1-day HA for chromium. However, the Agency has derived 10-day and longer-term HAs based upon NOAELs reported in animal toxicity studies, using an uncertainty factor of 100, and various intake assumptions and physiological parameters. The 10-day HA based on a NOAEL of 14.4 mg/kg/day reported in a 60-day study in which rats were exposed via drinking water is 1,400 ug/l and 5,000 ug/l for a 10-kg child and 70-kg adult, respectively. The corresponding longer-term HAs, based on a NOAEL of 2.41 mg/kg/day reported in a chronic study in which rats were exposed via drinking water, are 240 ug/l (child) and 840 ug/l (adult) (EPA 1985d). The lifetime HA of 120 ug/l was derived in the same manner and is equivalent to the proposed RMCL (EPA 1985d).

The EPA national ambient water quality criteria for the protection of human health are 50 ug/l and 170,000 ug/l for Cr(VI) and Cr(III), respectively (EPA 1980).

#### M.4 COPPER

#### Noncarcinogenic Effects

Copper is toxic at high-dose levels and is an essential element at lower levels. Toxic effects following acute exposure in man and laboratory animals include gastrointestinal disturbances, hemolytic anemia, and liver and kidney damage. Limited data are available on copper's chronic toxicity; however, efficient homeostatic mechanisms generally protect mammals from excess dietary copper (EPA 1985c).

Copper is regarded as an essential element in mammalian nutrition based on its requirement in many enzymatic reactions. Copper deficiency can result in decreased iron absorption and iron deficiency, and may also lead to reproductive abnormalities (NAS 1980).

EPA has developed an AADI based upon a LOAEL of 5.3 mg/day reported in human clinical case studies (EPA 1985c). EPA derived an AADI of 1,300 ug/l from the LOAEL by applying an uncertainty factor of 2, assuming consumption of 2 liters of water per day (EPA 1985c).

# Carcinogenicity and Mutagenicity

Several carcinogenicity studies in animals receiving copper orally have been negative. However, because of methodological deficiencies in these studies, as well as the absence of human data, EPA has classified copper according to weight-of-evidence carcinogenicity criteria in Group D--inadequate data in humans and animals (EPA 1985c).

Copper compounds have generally provided negative results in mutagenesis assays. Copper sulfate was reported to increase the frequency of recessive lethal mutations in <u>Drosophilia melanogaster</u> at high concentrations.

#### Drinking Water Standards and Criteria

#### Standards

There is currently no primary enforceable EPA drinking water standard for copper. Copper is included in the National Secondary Drinking Water Regulations as a nonenforceable criterion of 1,000 ug/l based upon organoleptic effects (taste and odor). EPA has issued a proposed RMCL of 1,300 ug/l equivalent to the AADI. As the AADI was based on acute effects, the Agency made no adjustments using human exposure data (EPA 1985c).

#### Criteria

The EPA has developed a 1-day HA for both adults and children for copper of 1,300 ug/l based upon the same methodology and data used to derive the proposed RMCL (EPA 1985c). In the absence of suitable data, the Agency did not calculate 10-day longer term or lifetime HAs.

NAS has not developed any SNARLs for copper.

EPA ambient water quality criterion for the protection of human health based upon organoleptic effects is 1,000 ug/l (EPA 1980).

#### M.5 CYANIDES

#### Noncarcinogenic Effects

Cyanides are organic or inorganic compounds that contain the cyanide-moiety (CN). Organic cyanides are referred to as nitriles. Cyanides are readily absorbed from the lungs, gastrointestinal tract, and skin by animals and man. Cyanides exhibit their toxicity by combining with the cellular hemoglobin, resulting in tissue hypoxia.

EPA has calculated a provisional AADI based upon a two-year study in which rats were administered diets containing 0 to 300 mg/kg hydrogen cyanide (EPA 1985c). Using a NOAEL of 10.8 mg/kg/day, an uncertainty factor of 500, and assuming 2 liter drinking liter water consumption, EPA derived an AADI of 750 ug/l for a 70-kg adult and 220 ug/l for a 10-kg child.

Effects on reproduction and development have not been reported at doses below maternally toxic doses.

# Carcinogenicity and Mutagenicity

Potassium cyanide was reported to be not mutagenic in <u>in vitro</u> assays. Cyanide has been classified in EPA's Group D, not classifiable--inadequate human and animal evidence of carcinogenicity (EPA 1985c).

# Drinking Water Standards and Criteria

#### Standards

Because they have only been rarely detected, and when they have been detected, it has been at levels greatly below the AADI, EPA has decided not to regulate cyanides in drinking water (EPA 1985c).

#### Criteria

EPA has developed a 1-day and 10-day health advisory (HA) of 220  $\mu$  ug/l for a 10-kg child by appropriate modification of the lifetime HA of 750  $\mu$  ug/l for daily drinking water intake (1 liter) and weight (10 kg) (EPA 1985d).

Both the ten-day and lifetime HAs of 750 ug/l for an adult were developed by application of a 500-fold uncertainty factor, and standard intake assumptions and physiological parameters to a NOAEL of 10.8 mg/kg/day reported in a chronic study of rats receiving cyanide in the diet (EPA 1985). EPA has not developed any longer-term HAs for cyanides.

The National Academy of Sciences has not developed any SNARLs for cyanides. EPA has developed an ambient water quality criterion for the protection of human health of 200 ug/l (EPA 1980). In 1985, EPA proposed to revise this level to 3,770 ug/l (EPA 1985p).

#### M.6 DICHLOROBENZENES (DCBs)

#### Noncarcinogenic Effects

The principal toxic effects of o-dichlorobenzene (1,2-dichlorobenzene, o-DCB) and p-dichlorobenzene (1,4-dichlorobenzene or p-DCB) in humans and other animals from acute and longer-term exposures include central nervous system depression; blood dyscrasias; and lung, kidney and liver damage. Similar data are not available for



m-dichlorobenzene (1,3-dichlorobenzene or m-DCB). However, based upon short-term assays, EPA has determined that short-term health assessments developed for o-DCB should apply to m-DCB.

#### Carcinogenicity and Mutagenicity

The few studies available on the carcinogenic potential of the DCBs have been negative. Preliminary results of a National Toxicology Program (NTP) gavage bioassay indicate that o-DCB was not carcinogenic under the conditions of the experiment. Pending receipt of the final NTP report for o-DCB, EPA has categorized all three DCB isomers according to Agency weight-of-evidence carcinogenicity criteria in Group D, not classifiable as to human carcinogenicity (EPA 1985j).

In general, DCBs have shown little or no mutagenic activity in a range of bacterial systems. However, several studies with mold and plant cultures treated with DCBs have reported mutations and chromosomal alterations (EPA 1985k).

# Drinking Water Standards and Criteria

#### Standards

EPA is in the process of establishing an enforceable MCL for o-DCB and p-DCB but not m-DCB. As a first step in the process, EPA has issued a proposed recommended MCLs (PRMCL) for o-DCB based upon a NOAEL reported in a subchronic gavage study in mice and rats. Based upon a NOAEL of 125 mg/kg/day, an uncertainty factor of 100, allocation of 20 percent of the total human intake from all exposure sources to drinking water, and various intake and physiological assumptions, EPA has derived a PRMCL for o-DCB of 620 ug/l. EPA has also issued a proposed MCL for p-DCB of 750 ug/l, based upon a NOAEL of 150 mg/kg/day reported in a rat gavage study, an uncertainty factor of 1,000, and standard intake assumptions and physiological parameters (EPA 1984c).

In the absence of sufficient data, EPA has not developed and is not in the process of developing, a drinking water standard for m-DCB.

#### Criteria

No 1-day or 10-day health advisories (HAs) were derived by EPA for o-DCB, m-DCB, or p-DCB, due to absence of suitable data. The longer-term HA for o-DCB judged by EPA to be applicable to m-DCB, was developed using a NOAEL reported in a subchronic gavage study of o-DCB in rats and mice. Based upon a NOAEL of 125 mg/kg/day, an uncertainty factor of 100, and standard intake assumptions and physiological parameters and assumptions, EPA developed a longer-term HA for o-DCB and m-DCB of 8,930 ug/l (10-kg child` and 31,250 ug/l (70-kg adult) (EPA 1985d). The longer-term HA for p-DCB was derived from a NOAEL of 150 mg/kg/day reported in a subchronic gavage study. Based on this NOAEL, an uncertainty factor of 100 and standard EPA assumptions and physiological parameters, EPA derived longer-term HAs for p-DCB of 10,700 ug/l (child) and 37,500 ug/l (adult).

The EPA lifetime HA for o-DCB of 620 ug/l was derived in the same manner and is equivalent to the PRMCL. However, due to the absence of suitable data, the Agency has not developed a lifetime HA for m-DCB.

The lifetime HA for p-DCB was derived based upon a NOAEL in the NTP subchronic study. Using a NOAEL of 150 mg/kg/day, a 10,000-fold uncertainty factor and standard EPA assumptions and physiological parameters, the EPA derived a lifetime HA for p-DCB of 750 ug/l (EPA 1985d).

NAS has developed chronic SNARLs of 300 ug/l and 94 ug/l for o-DCB and p-DCB, respectively (NAS 1977, 1983).

The EPA ambient water quality criterion for the protection of human health applicable to an individual DCB isomer or the sum total of all three DCB isomers is 400 ug/l (EPA 1980).

#### M.7 DICHLOROMETHANE (METHYLENE CHLORIDE or DCM)

Studies in humans and animals of dichloromethane (DCM) have largely been limited to the inhalation route. Mild exposures result in central nervous system (CNS) disturbances, followed by rapid and complete recovery. Following more severe exposure, greater disturbances to the CNS and peripheral nervous system occur. DCM can be cardiotoxic to the heart, causing arrhythmias following acute exposure. Following intake, DCM is metabolized to carbon monoxide, resulting in decreased oxygen transport to cells via the blood, resulting in tissue hypoxia.

# Carcinogenicity and Mutagenicity

DCM has been shown to be carcinogenic in male and female mice (EPA 1985f). In addition, there is some evidence of carcinogenicity in male rats (EPA 1985f). No elevated cancer risks have been demonstrated in humans in epidemiological studies; however, EPA has judged these studies to be methodologically inadequate to detect cancer in man (EPA 1985f). Based upon EPA weight-of-evidence carcinogenicity criteria, EPA has placed DCM in category  $B_2$  - probable human carcinogen.

DCM in vitro mutagenicity assays have been positive in four different systems (EPA 1985e). Based upon weight-of-evidence criteria, EPA judged DCM to be a mutagen with the potential for inducing gene mutations in exposed human cells (EPA 1985e). In addition, the Agency concluded a positive response in cultured mammalian cells indicates that DCM may also cause chromosomal aberrations, but additional studies would be required to confirm these data (EPA 1985f).

#### Drinking Water Standards and Criteria

#### Standards

EPA has not established an MCL for DCM, and has not, as yet, initiated rule making to establish an MCL.

#### Criteria

EPA has derived a 1-day health advisory (HA) for dichloromethane in drinking water based on an acute toxicity study in which rats were exposed by gavage. Using a LOAEL of 1,326 mg/kg/day, an uncertainty factor of 1,000 and standard intake assumptions and physiological parameters, EPA developed a 1-day HA of 13,300 ug/l for a 10-kg child (EPA 1985d).

Based upon a NOAEL reported in a 13-week oral rat study, EPA derived a 10-day HA for a 10-kg child. The 10-day HA of 1,500 ug/l was derived by application of a 100-fold uncertainty factor along with standard intake assumptions to a NOAEL of 15 mg/kg/day (EPA 1985d).

In the absence of appropriate data, EPA did not derive a longerterm HA. However, EPA did calculate a lifetime HA based upon a NOAEL reported in a chronic study in which rats received DCM in drinking water. Based upon a NOAEL of 5 mg/kg/day, a 100-fold uncertainty factor and standard intake assumptions, EPA derived a lifetime HA for noncarcinogenic effects of 1,750 ug/l (EPA 1985d).

NAS has not developed SNARLs for DCM.

EPA has developed a national ambient water quality criterion for protection of human health based on noncarcinogenic effects of 13,400 ug/l (EPA 1980).

M.8 LEAD

#### Non-Carcinogenic Effects

When toxicity information is considered for non-carcinogenic effects of substances, the data are evaluated based on their dose-related response characteristics and the establishment of an exposure level below which no adverse effects are observed. Historically, the observed threshold or no-effect level for lead-induced toxic effects has continued to decline as more sophisticated experimental and clinical measures are employed to detect more subtle effects. These include alterations in physiological functions at PbB levels below the currently accepted maximum safe level for exposure to children, a segment of the population currently regarded to be at highest risk of lead-induced effects (EPA 1985c).

The most serious effects associated with markedly elevated PbB levels are severe neurotoxic effects that include irreversible brain damage. For most adults, such damage does not occur until PbB levels exceed 100 to 120 micrograms per deciliter (ug/dl). At these PbB levels, severe gastrointestinal symptoms and effects on several other organ systems are often found. Precise thresholds for occurrence of overt neurological and gastrointestinal signs and symptoms of lead exposure in cases of subencephalopathic lead intoxication have yet to be established, but such effects have been observed in chronically exposed adult lead workers at PbB levels as low as 40 to 50 ug/dl.

Toward the lower range of PbB levels associated with overt lead intoxication, less severe but important signs of impairment in normal physiological functioning in several organ systems are evident among apparently asymptomatic lead-exposed adults (EPA 1985c). These include:

- Slowed nerve conduction velocities indicative of peripheral nerve dysfunction (at PbB levels as low as 30 to 40 ug/dl);
- Altered testicular function (at PbB levels of 40 to 50 ug/dl);
   and
- Reduced hemoglobin production (at approximately 50 ug/dl).

EPA has concluded that all of the above effects point toward a generalized impairment of normal physiological functioning of several different organ systems as adult PbB levels exceed 30 to 40 ug/dl. Evidence of impaired heme synthesis effects in blood occur at even lower levels.

More recent research has indicated that there is a relationship between PbB levels and increases in blood pressure. Preliminary review of this work indicates a statistically significant correlation between PbB levels and diastolic blood pressure in white males, ages 40 to 50, with no threshold apparent in the range of 6 to 30 ug/dl. Of particular concern is the finding of a 2 mm Hg increase in diastolic pressure per incremental PbB level increase of 0.5 ug/dl. Possible increases in risk of more severe medical events (stroke, heart attack, death) associated with lead-induced increases in blood pressure are also estimated in one of the recently published studies.

Children represent a sensitive subpopulation with regard to lead toxicity. As with adults, lead affects many different organ systems and biochemical/physiological processes across a wide range of exposure levels. Effective PbB levels for producing encephalopathy or death in children are lower than in adults, starting at approximately 80 to 100 ug/dl. Permanent mental retardation and other marked neurological deficits are among lasting neurological sequelae typically seen in cases of nonfatal childhood lead encephalopathy. Other overt neurological signs and symptoms of subencephalopathic lead intoxication, such as peripheral neuropathies (functional and/or pathological changes in the peripheral nervous system), have been detected in some children at PbB levels as low as 40 to 60 ug/dl. Chronic kidney disease is not evident at PbB levels above 100 ug/dl. Moreover, colic and other overt gastrointestinal symptoms occur in children, at least

down to 60 ug/dl. Frank anemia is also evident at 70 ug/dl, representing an extreme manifestation of reduced hemoglobin synthesis at PbB levels as low as 40 ug/dl. All these effects are widely accepted as adverse health effects, and are reflective of widespread marked impact of lead on the normal physiological functioning of many different organ systems (EPA 1984e, 1985c).

Additional studies demonstrate further important health effects occurring in non-overtly lead-intoxicated children at similar or lower PbB levels than those indicated above. Among the most important and controversial of these electrophysiological and neuropsychological effects are indications of peripheral nerve dysfunction, indexed by slowed nerve conduction velocities (NCV) found in children with PbB levels lower than 30 ug/dl. EPA has concluded that while none of these studies on central nervous system (CNS) effects can individually be regarded as conclusively proving significant cognitive (IQ) or behavioral effects occurring below 30 ug/dl, they clearly indicate likely associations between neuropsychologic deficits and PbB levels as low as 30 to 50 ug/dl. The magnitude of average observed IQ deficits is approximately 5 points at mean PbB levels of 50 to 70 ug/dl and about 4 points at mean levels of 30 to 50 ug/dl. Whether a smaller risk exists at somewhat lower levels (15 to 30 ug/dl) cannot be determined at this time (EPA 1984e, 1985c).

Many different impacts (representing potentially impaired functioning and depleted reserve capacities of many different tissues and organs) have been noted at PbB levels below 30 ug/dl.

At PbB levels around 10 to 15 ug/dl, initial signs of detectable heme synthesis impairment occur in many different organic systems, indications of increasing degrees of pyrimidine metabolism interference, signs of altered nervous system activity, and interference in vitamin-D metabolism. EPA has stated that, on the basis of these data, these effects might be viewed as becoming sufficiently adverse to warrant avoidance as PbB levels exceed 20 to 25 ug/dl (EPA 1985c).

#### Reproduction and Development

There is a paucity of exposure data on which to evaluate the effects of lead on reproduction and development in humans. Early studies of pregnant women exposed to high levels of lead indicated

toxic, but not teratogenic, effects on the conceptus. One recently reported study hints at birth anomalies possibly associated with exposure to low lead levels (mean cord blood level of 15 ug/dl) among women in the general population. However, the significance of these studies has been questioned because of the absence of reported statistically significant associations between cord blood levels and specific types of minor anomalies or any major anomalies. There are also no reliable data pointing to adverse effects in human offspring following lead exposure to fathers.

EPA has concluded that the current collective human data regarding lead's effects on reproduction on <u>in utero</u> development are insufficient for accurate estimation of exposure-effect or no-effect levels (EPA 1984c). In the absence of sufficient data, it has been suggested that it would be prudent to avoid lead exposures resulting in PbB levels exceeding 25 to 30 ug/dl to pregnant women and women of child-bearing age in general. This conclusion was based on the known equilibration between maternal and fetal blood lead concentrations and growing evidence of deleterious effects in young children as PbB levels approach 25 to 30 ug/dl. Industrial lead exposure of men with PbB levels of 40 to 50 ug/dl also appears to result in altered testicular function.

#### Carcinogenicity

Several studies have reported renal tumors in Wistar rats following ingestion of high doses of a lead salt (lead acetate). Lead subacetate (another lead salt) has produced benign tumors (renal carcinomas or adenomas) in Swiss mice and several strains of rats, but not golden hamsters. Gliomas (central nervous system tumors) were also observed in many of these studies.

There have been a number of epidemiological studies which have assessed the mortality experience of lead-exposed workers. In some of the studies, no excess cancer mortality was observed. In one study, non-statistically significant excess cancer mortality of the respiratory system and cancer of the digestive organs and peritoneum was reported, which on evaluation by other statistical techniques by another investigator was reported to achieve statistical significance. Another study has reported increased mortality from renal cancer among

a group of lead smelting workers. However, this excess mortality, based on only six cases, did not achieve statistical significance. On review of all of these studies, EPA concluded that the absence of good lead exposure documentation made it difficult to assess the contribution of lead to the observed results.

The International Agency for Research on Cancer (IARC) has classified lead in Group 3, inadequate evidence for carcinogenicity in humans, sufficient evidence for carcinogenicity in animals (for some salts). EPA has classified lead in category  $B_2$  (sufficient evidence in animals, insufficient evidence in humans) according to the Agency's Guidelines for Carcinogen Risk Assessment (51  $\underline{FR}$  33992-34003, September 24, 1986). However, the agency noted that the doses inducing kidney tumors in positive rat studies were beyond the human lethal dose, and several epidemiological studies have not demonstrated an association between lead exposure and elevated cancer mortality in occupationally exposed workers. Consequently, EPA has recently proposed to set an RMCL in drinking water based on non-carcinogenic endpoints.

# <u>Drinking Water Standards and Criteria</u>

#### Standards

The current MCL for lead under the National Interim Primary Drinking Water Regulations is 50 ug/l. This limit was designed to limit PbB levels in 99.5% of the population of below 30 micrograms per deciliter (ug/dl).

NAS (1984) has stated that the current MCL, in view of other environmental sources of exposure, may not provide a sufficient margin of safety, particularly for fetuses and young children.

EPA, in agreement with this assessment, has recently taken the first step in lowering the MCL by issuing a proposal that would establish an RMCL based on human health of 20 ug/l. This level was derived based on a target PbB level of 15 to 20 ug/dl for protecting children and infants, using a conversion factor of 6.25 to translate PbB to lead in drinking water (assuming a consumption of 1 liter of water per day) and an uncertainty factor of 5 (EPA 1985c). After finalization of the RMCL, EPA would then factor in other data, such as technological feasibility, to establish a revised MCL.

#### Criteria

EPA has not developed 1-day, 10-day or longer-term HAs for lead. The lifetime HA of 20 ug/l is equivalent to, and was derived in the same manner as, the proposed RMCL (EPA 1985d).

NAS has not developed SNARLs for lead.

The EPA ambient water quality criterion for the protection of human health is 50 ug/l (EPA 1980).

M.9 TETRACHLOROETHYLENE (PERCHLOROETHYLENE or PERC)

#### Noncarcinogenic Effects

The principal toxic effects following acute exposure in animals to tetrachloroethylene (PERC) are depression of the central nervous system (CNS), ataxia (failure of muscular coordination), and respiratory cardiac arrest. Subchronic and chronic effects in animals include damage to the liver and kidney effects. In humans, the principal effects are CNS depression and liver toxicity.

# Carcinogenicity and Mutagenicity

A 1977 National Cancer Institute bioassay in which PERC was administered by gavage reported increased incidence of liver tumors in mice but not rats (EPA 1985d). A draft report of a National Toxicology Program (NTP) inhalation bioassay, currently under internal review, has noted an increased incidence of tumors in mice and rats. Although EPA has previously categorized tetrachloroethylene in Group  $B_2$ -probable human carcinogen (EPA 1985b, 1985h), the Agency is awaiting final results of the NTP bioassay before commencing a rule making for the chemical in drinking water.

PERC has been evaluated for its ability to cause gene mutation, chromosomal aberrations, unscheduled DNA synthesis, and mitotic recombination. In general, these responses have been weak and were observed at high concentrations that were cytotoxic (EPA 1985h). Additionally, no dose-dependent relationships were demonstrated in these studies (EPA 1985h).

#### Drinking Water Standards and Criteria

#### Standards

EPA has not established an MCL for PERC in drinking water. The agency is scheduled to begin rule making to establish a MCL in the near future.

#### Criteria

In the absence of suitable data, EPA has not derived a 1-day health advisory (HA) for PERC. EPA derived a 10-day HA based upon a LOAEL of 70 mg/m $^3$  reported in a study of humans following inhalation for 7 hours per day for 5 consecutive days. Using the LOAEL, an uncertainty factor of 1,000, and various intake and physiological assumptions, EPA derived a 10-day HA for a 10-kg child of 34,000 ug/l.

Using a NOAEL of 475 mg/m $^3$  reported in a subchronic inhalation study in rats, a 100-fold safety factor and standard assumptions, EPA derived longer-term HAs of 1,940 ug/l (child) and 6,800 ug/l (adult). Using a similar methodology, EPA derived a lifetime noncarcinogenic HA of 680 ug/l for 70-kg adult based on a NOAEL of 475 mg/m $^3$  reported in a chronic rat inhalation study (EPA 1985d).

As noted by EPA, the lifetime HA applies to noncarcinogenic effects only, and would correspond to significant estimated lifetime cancer risks (EPA 1985d).

NAS has calculated 1-day and 10-day SNARLs for noncarcinogenic effects of 172,000 ug/l and 24,500 ug/l, respectively (NAS 1980).

The EPA ambient water quality criterion for the protection of human health corresponding to an one-in-a-million incremental lifetime excess risk estimated on the basis of animal data is 0.8 ug/l (EPA 1980).

#### M.10 TOLUENE

#### Noncarcinogenic Effects

Acute or chronic exposure to high levels of toluene in animals results in central nervous system depression and effects on the lungs, liver, and kidney.

EPA has derived an AADI for drinking water consumption based upon a 24-month inhalation study in rats (EPA 1985). Based upon a NOAEL of  $1,130 \text{ mg/m}^3$ , an uncertainty factor of 100, and assuming 50 percent pulmonary absorption, EPA derived an AADI of 10,100 ug/l (EPA 1985c).

# Carcinogenicity and Mutagenicity

Only one long-term carcinogenicity bioassay of toluene has been reported. This study concluded that toluene was not carcinogenic following inhalation in rats. The National Toxicology Program is conducting 2-year carcinogenicity studies in which toluene is being administered by inhalation and gavage to rats and mice. In addition, carcinogenicity studies by European investigators are expected to be published in the next few years. According to weight-of-evidence carcinogenicity criteria, EPA has classified toluene in Category D, not classifiable as to human carcinogenicity (EPA 1985c).

Toluene has not been shown to be mutagenic in  $\underline{\text{in } \text{vivo}}$  or  $\underline{\text{in } \text{vitro}}$  assays.

# Drinking Water Standards and Criteria

#### Standards

In the first stage of rule making designed to establish an MCL for toluene in drinking water, EPA has issued a proposed RMCL of 2,600 ug/l derived from the AADI of 10,100 ug/l by allocating a 20 percent drinking water contribution to total intake from all sou ces of exposure (EPA 1985c). Subsequent to finalization of the RMCL, EPA will evaluate analytical feasibility and feasibility of control in establishing an enforceable MCL.

#### Criteria

In the absence of adequate dose-response data for oral exposure to toluene, EPA derived a 1-day health advisory (HA), based on NOAEL of  $377 \text{ mg/m}^3$  reported in studies of humans, the subjects of single inhalation exposures for up to 8 hours. Based upon the NOAEL, an uncertainty factor of 100, and a variety of physiological parameters and intake assumptions, EPA derived 1-day HAs of 18,000 ug/l and 63,000 ug/l for a 10-kg child and 70-kg adult, respectively (EPA 1985a).

In the absence of sufficient data, EPA derived 10-day HAs of 6,000 ug/l (child) and 21,000 ug/l (adult), by applying an uncertainty factor of 3 to the 1-day HA. The Agency utilized a three-fold rather than the usual 10-fold uncertainty factor because toluene is rapidly distributed and excreted and because the chemical presents little bioaccumulation potential relative to typical toxicants (EPA 1985d).

The EPA ambient water quality criterion for the protection of human health is 14,300 ug/l (EPA 1980).

M.11 1,1,1-TRICHLOROETHANE (TCA)

#### Noncarcinogenic Effects

The principal noncarcinogenic effects of 1,1,1-trichloroethane (TCA) following exposure in animals and man are depression of the central nervous system, increase in liver weight and cardiovascular changes. Current data do not suggest that TCA is reproductive of developmental toxin.

EPA has developed a risk reference dose (RRfD) of 0.35 mg/kg/day based upon a NOAEL of 1,365 mg/m $^3$  reported in a study in which mice were exposed by inhalation for 14 weeks. EPA derived the RRfD by application of an uncertainty factor of 100, and a 30% absorbed dose and standard physiological parameters (EPA 1985d).

#### Carginogenecity and Mutagenicity

There have been two TCA carcinogenicity bioassays. The first, conducted by the National Cancer Institute (NCI), was judged to be inadequate due to poor survival in treated animals. Preliminary results of the second, by the National Toxicology Program, showed elevated incidences of hepatocellular carcinomas. These initial results have been questioned and the study is currently being audited (EPA 1985b). Based upon these results, EPA has classified TCA according to weight-of- evidence criteria in group D, Not Classifiable--inadequate human and animal evidence of carcinogenicity (EPA 1985b).

#### Drinking Water Standards and Criteria

#### Standards

Currently, there is no MCL for TCA in drinking water. In the first phase of a regulatory program to establish an MCL, EPA has issued a final RMCL of 200 ug/l (EPA 1985b). The RMCL was derived from the RRfD of 35 mg/kg/day by application of standard weight (70 kg), drinking water intakes (2 l/day), and allocation of 20% of total daily intake to drinking water intake (EPA 1980).

#### Criteria

EPA has developed a 1-day health advisory (HA) based upon a LOEL of 1.4 g/kg/day reported in a study of rats receiving a single oral dose of TCA. Based upon the LOEL, and standard weight and intake assumptions, EPA derived a 1-day HA of 14,000 ug/l for a 10-kg child (EPA 1984d). In the absence of sufficient data, EPA has not developed a 10-day HA. EPA has developed longer-term HAs of 35,000 ug/l (child) and 125,000 ug/l (adult), based upon a NOAEL of 0.5 g/kg/day reported in a study in rats receiving TCA by gavage for 12 weeks (EPA 1985d).

The EPA lifetime HA of 200 ug/1 is equivalent to and was derived by the same methodology as the RMCL (EPA 1985d).

NAS has developed 1-day, 7-day and chronic SNARLs for TCA of 490,000 ug/l, 70,000 ug/l, and 3,000 ug/l, respectively (NAS 1980).

The EPA ambient water quality criterion for TCA for the protection of human health is 18,700 ug/l (EPA 1980).

#### M.12 TRICHLOROETHYLENE (TCE)

# Noncarcinogenic Effects

The principal toxicological effect of concern for trichloroethylene (TCE) is carcinogenicity. Noncarcinogenic effects include central nervous system disturbances, kidney and liver damage following exposure to relatively high airborne concentrations.

#### Carcinogenicity and Mutagenicity

Six studies of the carcinogenicity of TCE in animals have been published. Two have reported significant increases in liver tumors in

mice. EPA has judged three others as technically flawed. A sixth reported that TCE containing epichloruhydrin and epoxybutane was carcinogenic in a less responsive mouse strain, but pure TCE was not (EPA 1985b). Recognizing the lower responsiveness of the mice in the latter study, EPA has classified TCE based upon weight-of-evidence carcinogenicity guidelines in category B2 - probable human carcinogen.

Commercial trichloroethylene containing stabilizers has been reported to be weakly mutagenic in a variety of in vitro and in vivo assays representing a wide evolutionary range of organisms (EPA 1985g). Based on these data, EPA has concluded that commercial trichloroethylene may have the potential to cause weak or borderline increases above the spontaneous level of mutagenic effects in exposed human tissues (EPA 1985g).

#### Drinking Water Standards and Criteria

#### Standards

EPA is currently conducting a rule making to establish an MCL for TCE in drinking water (EPA 1985b). As a first step in the rule making, EPA has established an RMCL of 0 based upon the Agency's determination that no level of exposure above 0 is an acceptable health goal for a carcinogen. Based upon analytical feasibility and control considerations, EPA has issued a proposed MCL of 5 ug/l. Subsequent to review of the rule making record, EPA will establish an enforceable MCL.

#### Criteria

In the absence of suitable data, EPA has not developed 1-day, 10-day, or longer-term health advisories (HAs) for TCE (EPA 1985d). Based upon a LOAEL reported in a 14-week rat inhalation study, EPA developed a lifetime HA of 260 ug/l (EPA 1985d). In the derivation, EPA applied a 1,000-fold uncertainty factor and various intake assumptions to a LOAEL of 300 mg/m $^3$ . However, as TCE has been classified as a probable human carcinogen, this level should not be applied (EPA 1985d).

NAS has developed 1-day and 7-day SNARLs for noncarcinogenic end points of 105,000 and 15,000 ug/l, respectively (NAS 1980).

EPA has also developed an ambient water quality criterion for protection of human health based upon noncarcinogenic effects of 6,770 ug/l (EPA, 1980).

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Part of the Configuration

# APPENDIX N

TECHNICAL OPERATIONS PLAN/HEALTH AND SAFETY PLAN

## TECHNICAL OPERATIONS PLAN REESE AFB, TEXAS PHASE II – CONFIRMATION STUDY

May 10, 1985

Prepared for:

OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY Technical Services Division



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#### INTRODUCTION

This Technical Operations Plan has been prepared to support the Phase II - Confirmation Study at Reese Air Force Base (AFB), Texas, and represents site-specific work plans and descriptions of technical operations proposed to be carried out as part of the Installation Restoration Program (IRP). This plan is the result of (1) an evaluation of the Phase I - Records Search Report, (2) participation in a presurvey tour with sampling and analysis of the active water supply wells, and (3) decisions and information agreed to during the presurvey meeting and with Dr. John K. Yu (OEHL/TSS), Col. R.C. Wooten, Ph.D. (OEHL/TSS), Lt. Raymond A. Peters (Reese AFB), and 2nd Lt. Mark Stuart (Reese AFB). The work plans for each site are designed to address the scope of activities described for Stage I of the Phase II program, namely, to provide a qualitative assessment of the environmental contamination using a minimum of investigative activities at the sites.

The history of the installation and practices involving hazardous wastes are described in the Phase I report and will not be reiterated here. The listings of sites recommended in the Phase I report for investigation have been modified to conform to the agreements of the presurvey meeting and tour as follows:

- Industrial Waste Lake (S-1);
- Sewage Lake (S-2), including study also related to the East Landfill (D-3), the North Landfill (D-4), the West Landfill (D-5), and the Inactive Fire Training Area (FT-3);

- POL Storage Area (Aquasystem) Spill Site (SP-1);
- Southwest Landfill (D-1);
- Civil Engineering Paint Shop Trench (SI-4);
- Active Fire Training Area (FT-1), including Drainage Impoundment (SI-3);
- Northwest Landfill/Rubble Area (D-11); and
- Hurlwood Aquisition and Landfill (D-7).

Descriptions of the Stage I scope of work for each of these sites are included in Section 2.

#### 2. PROPOSED WORK PLANS FOR STAGE I SITE INVESTIGATIONS

The work plans were developed to accomplish Tasks 5a, b, and c of the 8 Feb 1985 Description of Task in F33615-83-D-4003, Proposed Order 4, as described below:

- Task 5a Determine the presence or absence of contaminants within the area of investigation;
- Task 5b If contamination exists, determine the potential for migration of these contaminants in the various environmental media; and
- Task 5c Assess the potential environmental or health risks associated with contaminants in this environmental setting.

To accomplish these goals, several field investigation techniques will be used including:

- Geophysical surveys to determine the perimeter of the various landfill sites and to characterize buried metal, drums, and unique subsurface features, including contaminant plumes;
- Soil-gas survey to determine the presence and extent or absence of spilled petroleum product;

- Soil/sediment sampling, both grab and composite, to determine the presence or absence of shallow subsurface contamination;
- Soil borings with logging and sampling down to the first available water (estimated at 50 feet for a limestone formation) and to the aquifer on the Ogallala formation (at 170 to 180 feet with artesian water at 120 to 130 feet); and
- Monitoring well installation, with sampling of both new and existing wells to determine potential environmental or health risks.

All samples will be split in the field, with delivery of the splits to OEHL/SA at Brooks AFB, Texas.

All soil and sediment samples will be monitored in the field for volatile contaminants. Water samples will be tested in the field for pH, conductivity, and temperature. In general, samples will be analyzed for oil and grease, organic halogen (by either EPA 8010/8020 for soils, or EPA 601/602 for water), and TOC as screening tests for potential contamination. Where appropriate, heavy metals analyses will be run. In the case of the Industrial Waste Lake (SI-1), the Sewage Lake (SI-2), the French Drain (SI-4), and the Hurlwood Acquisition and Landfill (D-7), gas chromatogram/mass spectrometer (GC/MS) analyses will be run for more complete quantification of suspected contamination to facilitate more efficient remediation of these sites.

The Texas Water Well Drillers Act of 1965 as amended in 1981 (Article 7621e) for drilling into groundwater layers requires that upon completion of work on a borehole it must be sealed either by finishing off as a well or by pressure grouting (see Section 14). This is also good drilling practice. Given the need to make borings into water-bearing layers and the requirement to finish the hole, there is an advantage in maintaining access to those subsurface waters for future monitoring by setting monitoring wells. Should that need end at a later date, the wells themselves can be pressure grouted for sealing at that time. E & E estimates that the incremental cost to set a monitoring well will be comparable to the cost of pressure grouting the borehole for shallow borings (50 feet, see Table 2-1).

Table 2-1

COMPARATIVE COST ESTIMATE - PRESSURE GROUTING VS.

MONITORING WELL INSTALLATION

	Unit Price	Estimated Quantity	Total for Well	Total for Pressure Grouting
Soil boring	\$ 16.00/LF	50 LF	\$ 800.00	\$ 800.00
Split-spoon samples	5.00/sample	11 samples	55.00	55.00
2-inch ID PVC casing	4.16/LF	45 LF	187.00	
2-inch ID PVC screen	5.32/LF	10 LF	53.20	
PVC plugs and caps	4.44 each	2	8.88	
Installation and materials				
<ul><li>Sand</li></ul>	1.65/LF	12 LF	19.80	
<ul> <li>Bentonite</li> </ul>	16.65/LF	2 LF	33.30	
• Cement	1.32/LF	36 LF	47.52	
Furnish and install well protection with locking cap and guard posts (3)	250.00 each	1	250.00	
Supply and install grout*	10.80/LF	50 LF		540.00
TOTALS		<del></del>	\$1,454.70	\$1,395.00

Assuming 50-foot borehole; split-spoon samples every five feet.

<sup>\*</sup>Installation time is assumed to be the same for either monitoring well installation or pressure grouting; installation time charges not included.

LF = linear feet

Based on the above rationale, it is cost-effective to set monitoring wells during Stage I for boreholes where the current need may only be marginal.

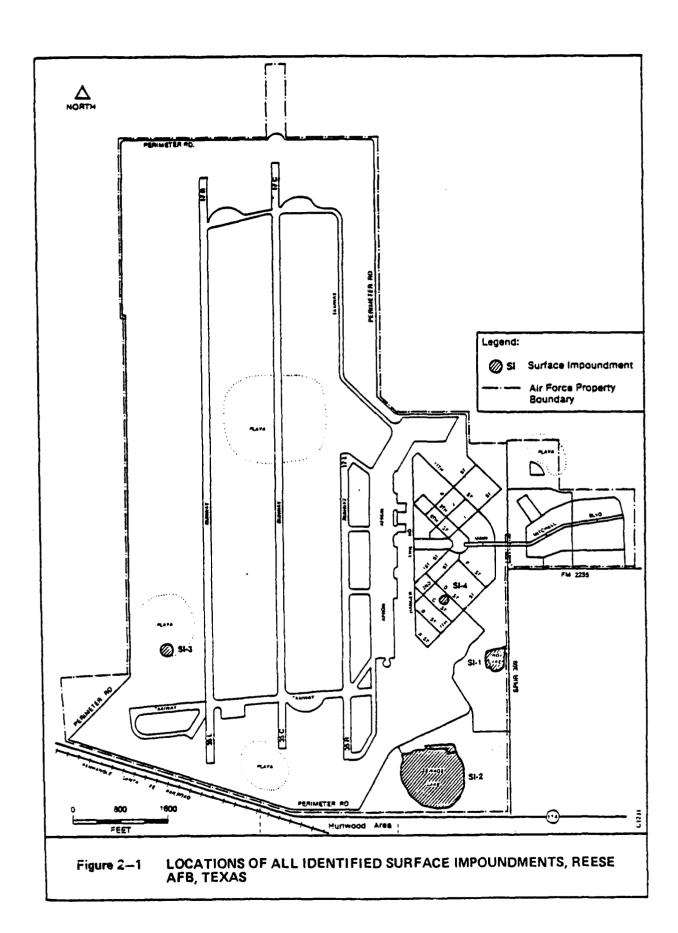
All wells and borings will be installed according to applicable state and federal regulations (op cit, water well drillers must be licensed in the state of Texas). Drilling activity will be coordinated with appropriate base personnel consistent with overall base management and planning. All applicable state permits and registrations will be obtained, and well data (well logs) as required by the state of Texas will be reported in coordination with Reese AFB and OEHL/TSS.

The following sections outline the recommended work plans for each site. The Technical Operations Plan (Sections 3 through 14) contains additional information on sampling and analytical procedures, and borehole and monitoring well construction.

#### 2.1 INDUSTRIAL WASTE LAKE (SI-1, HEREIN DESIGNATED SITE 1)

#### Setting

The Industrial Waste Lake (Site 1) is located in the southeast quadrant of the base, adjacent to the fence line along Spur 309 (see Figure 2-1). The lake receives surface water runoff from most of the base area, as well as drainage from the flightline and the industrial shops. There is an oil-water separator three-quarters of a mile upstream from the lake inlet point to separate water-immiscible. lighter-than-water materials. While a flood control system has been installed (1977 and 1982) to prevent overflow of the lake, past flooding has overflowed the banks, even into the field to the east just across Spur 309. In this stage of the confirmation study, survey for potential contaminants in the immediate areas of the lake on the base proper is proposed. Potential contaminants of concern are organics and heavy metals. The past findings of sampling and analyses conducted by the Texas Department of Health and Reese AFB suggest that more specific analyses (GC/MS quantitative analyses) should be run on selected samples at this site to aid in developing recommendations for potential Stage II studies.



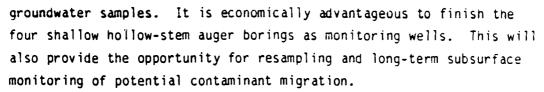
#### Investigation

Borings. To determine the presence or absence of contamination and to augment the sampling previously conducted for the Industrial Waste Lake, five borings will be made around the perimeter of the lake. Four of these are shallow borings to the first water-bearing layer, a limestone layer, nominally set for planning purposes at a depth of 50 feet. Split-spoon samples will be taken at the usual 5-foot intervals with the option to sample at changes in soil type or strata giving positive screening results for volatile components. A maximum of 11 soil samples will be sent for screening analyses.

A fifth boring will be made down to the Ogallala formation, usually found at about 150 to 180 feet, but set for planning purposes in this study at 200 feet. In this boring, attention will be directed to the strata below the limestone layer and up to five soil samples may be collected for screening analyses based on visual changes in the drill cuttings and volatile component monitoring. The purpose of this boring is to make possible an evaluation of potential migration and attenuation of pollutants with depth and to allow and/or provide evaluation of the impact of potential contamination on the groundwater at the present time and/or baseline information on the current characteristics of the groundwater in the area. In addition, this boring, in conjunction with the borings at the various other sites, will provide knowledge of the overall stratigraphy of the base property as well as information on groundwater characteristics.

All drill cuttings in the shallow borings must be drummed and staged until the analytical results are known. It is expected that the base will provide a secure area for the drums. Reese AFB will be responsible for the disposal of the drill cuttings. Because of potential cross-contamination from using drill cuttings as backfill in setting a monitoring well, all cuttings from the deep boring must be drummed and treated the same as those from the shallow borings.

Monitoring Wells. Each of the five borings will be finished as a monitoring well, developed, and sampled, yielding a total of five



The deep boring is required for confirmation assessment of the impact of potential contamination on groundwater. The preferred drilling technique is air/mud rotary, and groundwater sampling requires that the boring be cased and developed. Finishing the boring as a monitoring well is essentially the same operation as one-time boring and sampling. With the addition of a dedicated submersible pump, the total cost of such a well is estimated at about \$11,000 (see Table 2-2). Should the well subsequently be sampled two or more times, the time savings for purging alone will pay for the cost of the pump. This approach is recommended for each of the deep borings in this study. The deep boring work will be subcontracted to occur while the shallow drilling is underway by E & E to allow efficient monitoring of subcontractor operations and maximum quality control.

The purge and development water from all the wells will be collected in a temporary storage reservoir and screened in comparison with water from the Industrial Waste Lake. Upon successful screening, water will be discharged to the lake. If screening indicates greater contamination than in the lake, the water will be drummed for analysis and disposed of by Reese AFB.

Surveying of Wells. All wells will be surveyed to the nearest one-hundreth foot elevation by E & E and stamped under registration in the state of Texas. Filing of well information with the state of Texas will be coordinated with Reese AFB and OEHL/TSS.

Mounding Calculation. The information obtained from the five-well system will be used to complete a mounding calculation. Given the best available data and assumptions, the most appropriate equation (for instance, the equations of Hantush 1967; Bianchi and Haskell 1968; or Singh 1976) will be used to generate information on the horizontal and vertical migration of potential contaminants in the subsurface strata immediately surrounding the lake.

Table 2-2

COST ESTIMATE - INSTALLATION OF DEEP MONITORING WELL

	Unit Price	Estimated Quantity	Total for Well
Soil boring	\$ 18.00/LF	200 LF	\$ 3,600.00
Split-spoon samples	8.00/sample	5 samples	40.00
4-inch ID PVC casing	8.00/LF	175 LF	1,400.00
4-inch ID PVC screen	16.50/LF	30 LF	495.00
PVC plugs and caps	10.00 each	. 2	20.00
Installation and materials*			
• Sand	7.35/LF	32 LF	235.00
<ul><li>Bentonite</li></ul>	23.16/LF	2 LF	46.32
• Cement	4.65/LF	166 LF	772.00
Well development	95.00/hr	4 hrs	380.00
Decontamination and cleanup	95.00/hr	4 hrs	380.00
Furnish and install well protection with locking cap and guard posts (3)	250.00 each	1	250.00
Instali dedicated pump	3,200.00 each	1	3,200.00
TOTAL			\$10,818.32

<sup>\*</sup>Includes time charges for installation.

LF = linear feet

Sediment Sampling. Grab sediment samples will be taken at specific locations around and in the lake. Because sampling the analyses have been conducted previously, this it specific analyses taminant information by determining full priority sollutant analyses through GC/MS determinations for selected samples. The locations to be sampled include the lake bottom sediment, the inlet celta area, the rainwater drainage channels along Spur 309 and between the pionic area and the golf course, and the roadside barrow ditch discharge point southwest of golf green No. 2 at the road intersection.

The lake sediment samples will be taken by driving 2-foot split-spoon samplers, then splitting the top and bottom 1-foot sections as separate samples. This approach will allow either separate analysis of lake bottom soil and sludge or knowledge of and separate analysis of deposited sludge layers. These samples (four) will receive GC/MS and primary metals analyses.

The samples in the rainwater drainage and inlet channels will be taken by trowel in the top 6 inches of soil at a location upstream above the usual standing water level of the lake to evaluate potential "backup" contamination from overflow of the lake during rainfall or unusual situations (such as before the flood control system was installed). Typical screening analyses (EPA 8010/8020, Total Organic Carbon/Oil and Grease) will be run on these samples. Similar sampling and analyses will be run for the discharge point from the lake into the roadside ditch that eventually connects to the Sewage Lake (Site 2).

<u>Water Sampling</u>. A grab sample of the lake water will be analyzed by GC/MS for the full array of priority pollutants. Primary metals analyses will also be run.

2.2 SEWAGE LAKE (SI-2, HEREIN DESIGNATED SITE 2), INCLUDING EAST LANDFILL (D-3), NORTH LANDFILL (D-4), WEST LANDFILL (D-5), AND INACTIVE FIRE TRAINING AREA (FT-3)

#### Setting

The Sewage Lake (Site 2) is located in the southeast quadrant of the base near the intersection of Spur 309 and the Leveland Road (FM 114, see Figure 2-1). It is roughly four times the area of the Industrial Waste Lake. The Sewage Lake receives discharge from the

base sewage treatment plant and from the overflow of the Industrial Waste Lake. This lake allows evaporation of wastewater, and has no discharge. A Texas Tech University (Lubbock, Texas) study was conducted in about 1979 on the salamander population of the lake based on observation of cancerous growths on salamanders there. The salamander population is said to have reestablished itself since that time. Wildlife, namely ducks and frogs, were readily evident during the presurvey tour.

Several sites considered in the Phase I records search surround Site 2. These are the East Landfill (D-3), the North Landfill (D-4), the West Landfill (D-5), and the Inactive Fire Training Area (FT-3) (see Figures 2-2 and 2-3). The proximity of these sites to the Sewage Lake requires that they be studied together.

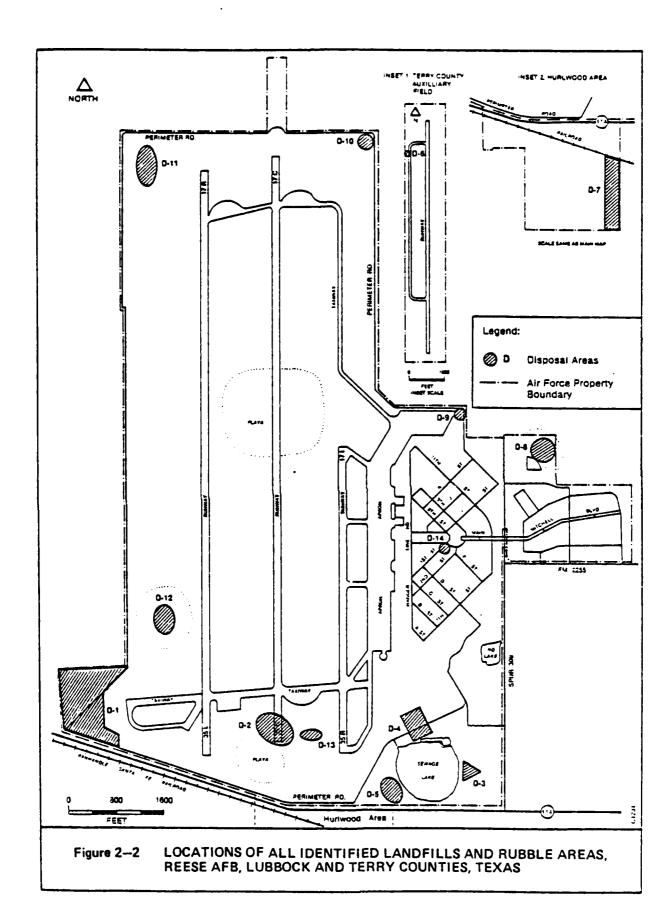
#### Investigation

Geophysical Surveys. Subsurface investigation for the presence or absence of potential contamination requires that the perimeters and depths of the surrounding landfills be determined. The presence of buried metal (as in containers) will also be determined by such a study. An electromagnetic conductivity survey will be conducted to define the perimeter of the landfill areas and to delineate the possibility and potential migration of an underground contaminant plume. A proton precession magnetometer survey will be conducted to determine the presence of subsurface metal objects either in the landfill area or adjacent to it where interference with drilling could occur.

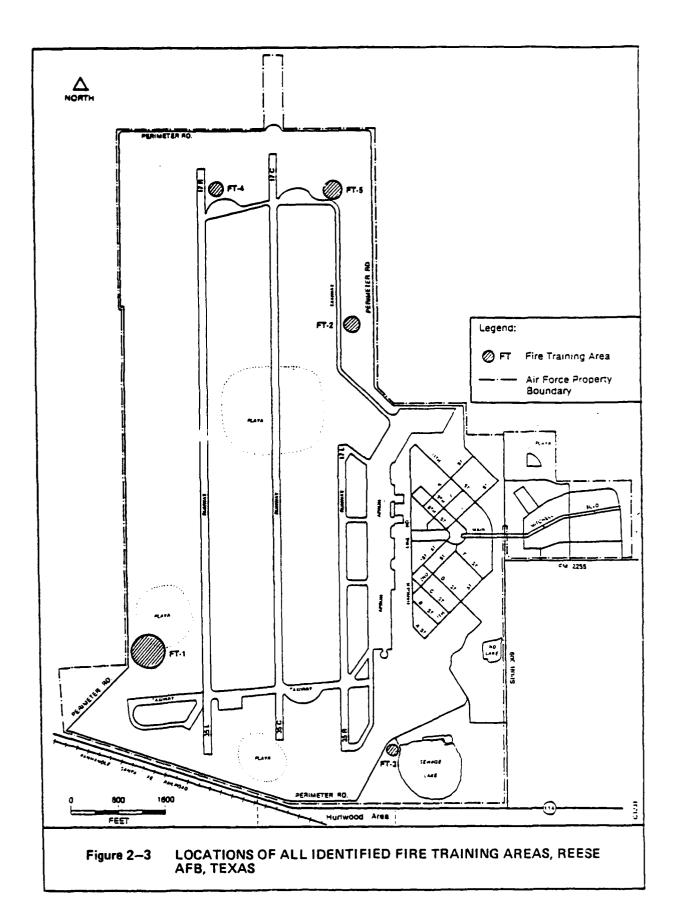
Borings. Four shallow hollow-stem auger borings will be made at locations midway between each of the surrounding sites and the lake. The protocol will be the same as for Site 1.

One deep boring will be made at a location southwest of the lake, the suspected downgradient side of the lake. Here, too, the drilling and soil sampling protocols will be the same as at Site 1.

Monitoring Wells. The borings (five) at Site 2 will be finished as monitoring wells using the same rationale and protocols as for Site 1. In this case, purge water from well development will be added to



2-11





the Sewage Lake since the potential contamination from the surrounding sites represents only an insignificant impact for a one-time disposal in that lake.

<u>Surveying of Wells</u>. All wells will be surveyed using the same protocols as for Site 1.

Mounding Calculation. -As at Site 1, a mounding calculation will be made to evaluate the potential for horizontal migration of contaminants with downward movement.

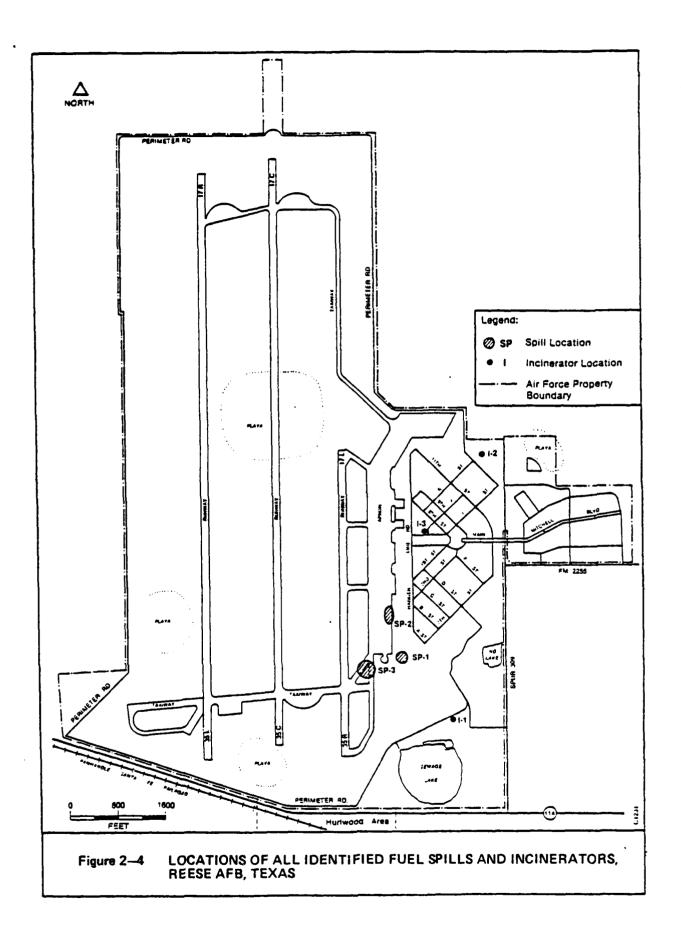
Sediment Sampling. Sediment samples will be taken by trowel in the areas of the sewage plant discharge into the polishing lake and the low-flow area at the outlet of the channel into the lake. Typical screening analyses (EPA 8010/8020, Total Organic Carbon/Oil and Grease) will be conducted on these samples. A lake sediment sample will be collected by driving a 2-foot split-spoon into the sediment. As at Site 1, the top and bottom of the sample will be separated and analyzed by GC/MS for the full array of priority pollutants. Primary metals analyses will also be run.

<u>Water Sampling</u>. A grab sample of the Sewage Lake water will be analyzed by GC/MS for the full array of priority pollutants. Primary metals analyses will also be run.

2.3 POL STORAGE AREA (AQUASYSTEM) SPILL SITE (SP-1, HEREIN DESIGNATED SITE 3)

#### Setting

A spill estimated at 1,000 gallons is documented as having occurred at this site (see Figure 2-4) in 1947 with subsequent contamination and closure of Well #4, cleanup by removal of contaminated soil, airing of the excavation, and backfilling with the aerated soil. It is thought that residue of that old spill or new leakage may be causing further fuel contamination of the POL area. Since Well #4 has been sealed, other investigative techniques are required. The depth of the Avgas Aquasystem (buried at 10 to 12 feet) suggests that a



2-14

Stage I screening survey for volatile organics could use 10 to 12 feet as a maximum depth.

#### Investigation

Soil-Gas Survey. This survey will be conducted using a slambar with extension, a Century Model 128 Organic Vapor Analyzer (OVA), and an MSA 260 Oxygen Meter/Explosimeter. Any background methane content in the clayey loam soils indigenous to the area or in the particular soils of this site will be filtered out by taking readings in each vent cavity (slambar hole) at each depth with and without a charcoal filter in the probe. The difference in the two readings is due to nonmethane/ethane hydrocarbon and combustible volatile materials. Mapping of the results of a soil-gas survey is known to provide rapid and accurate identification of the presence and extent of migration of spilled fuel.

#### 2.4 SOUTHWEST LANDFILL (D-1, HEREIN DESIGNATED SITE 4)

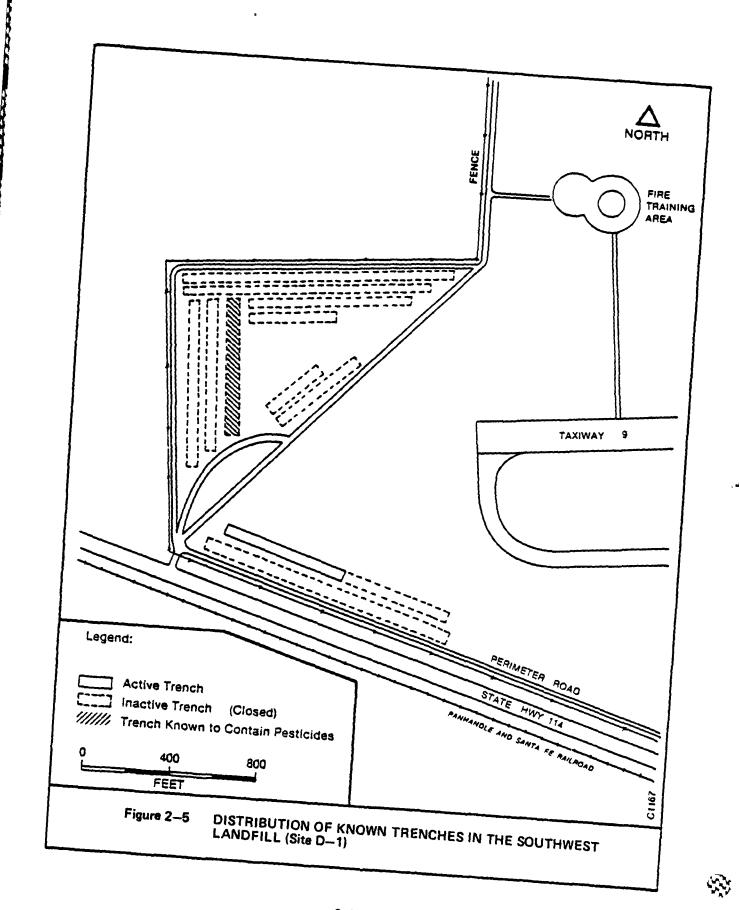
#### Setting

This landfill (see Figures 2-2 and 2-5) presents the interesting situation that one trench, a portion of the total, is suspect and no written records of disposal practices or materials were kept. The site is located in the southwest quadrant of the base, and wastes including pesticides, acids, cleaning solutions, paint chips, ether, cadmium sludge, and sludge from the Industrial Waste Lake (Site 1) were disposed of there.

#### Investigation

Geophysical Survey. Electromagnetic conductivity and proton precession magnetometer surveys will be conducted as for the landfills at Site 2. The same rationale applies.

Borings. The same approach and protocols will be applied at this site as at Sites 1 and 2, including those for the drill cuttings. Four shallow (50 feet) and one deep (200 feet) borings will be made.



No drilling into the fill itself will knowingly be undertaken. In addition to the typical screening tests (EPA 8010/8020, Total Organic Carbon/Oil and Grease), analyses for pesticides and primary metals analyses will be run.

Monitoring Wells. The borings (five) will be finished as monitoring wells, consistent with the approach and protocols for Sites 1 and 2. Analyses of the groundwater samples will include the same tests as for the soil samples, with the addition of pH, conductivity, temperature, and total dissolved solids.

<u>Surveying of Wells</u>. The monitoring wells will be surveyed using the same protocols and procedures as for Site 1.

2.5 CIVIL ENGINEERING PAINT SHOP TRENCH (SI-4, HEREIN DESIGNATED SITE 5)

#### Setting

This gravel French drain trench (see Figure 2-1) was used for the disposal of paint shop wastes, including toluene, kerosene, and acetone. In recent months, construction near the site has prompted study by borings and soil analyses to determine the type and extent of contamination. According to an undated letter, circa 7 Feb to 23 Apr 1985, from Colonel John C. Griffith, Commander, 64th ABG, to Messrs. Bryan W. Dixon and Bob Chapin, Texas Department of Water Resources (TDWR), Reese AFB is ready to excavate this site to a depth of 15 feet and to backfill with an impervious clay cap. The exploratory borings were made to a depth of 25 feet, at which no contamination was found. It is likely that by the time the Phase II Confirmation Study is initiated, the proposed remedial action will have been approved by TDWR and completed by Reese AFB.

#### Investigation

Boring. To confirm the findings to date and the remedial action proposed for this site, a single boring should be made down to the water table (200 feet nominal) or the first water-bearing layer.

Split-spoon soil samples, not to exceed 11, may be taken to confirm the cleanup and absence of further impact. A groundwater sample will be analyzed by GC/MS analysis to confirm no impact of organic contaminants. Primary metals analyses will also be run. This borehole will be sealed by pressure-grouting.

2.6 ACTIVE FIRE TRAINING AREA (FT-1, HEREIN DESIGNATED SITE 6), INCLUDING DRAINAGE IMPOUNDMENT (SI-3)

#### Setting

The fire training area (see Figure 2-3) consists of a work area about 40 feet in diameter with an annular concrete ring around a matal mockup of a jet plane. Prior to installation of the concrete, soil testing for lead and for oil and grease showed no contamination. At one edge of the site there is a concrete sump to collect drained fluids from the work area. The sump is about 6 feet deep; a gate valve about 1 foot from the bottom allows water to flow out of the sump through a pipe and onto the ground in a natural drainage path to a natural depression augmented by grading (designated SI-3 in the Phase I report). Located at the far end of this collection area is the site of a closed rubble landfill (designated D-12 in the Phase I report). The opportunity for runoff from the fire training area into these areas indicates that they should be considered together.

#### Investigation

Borings. Two shallow borings, one upgradient and one down-gradient, will be made to the first water-bearing layer, nominally 50 feet. Split-spoon samples will be taken every 5 feet and analyzed for organic halogens (EPA 8010/8020), TOC, oil and grease, and lead.

Monitoring Wells. The two borings will be finished as monitoring wells, developed, and sampled for groundwater. The two groundwater samples will be analyzed for purgeable organic halogens and aromatics (EPA 601/602), TOC, oil and grease, pH, total dissolved solids, temperature, and conductivity. The wells will be surveyed in the same manner as the other wells in this study.

Soil/Sediment Sampling. Composite sampling at up to six depths at four locations (24 samples) inside the fire training area will yield six composite samples for screening analyses for organic halogens, TOC, oil and grease, and lead. Grab sampling in the first 6 inches of the surface soil in the natural drainage path from the sump outlet and in the area of the natural (playa) depression will allow evaluation of the impact of contaminant migration from the fire training area. The two grab soil samples will also be analyzed for organic halogens, TOC, oil and grease, and lead.

2.7 NORTHWEST LANDFILL/RUBBLE AREA (D-11, HEREIN DESIGNATED SITE 7)

#### Setting

This site is located in the northwest quadrant of the base near the perimeter road and northwest of runway "A" (see Figure 2-2). According to interview reports of landfill disposal of drums of unspecified toxic wastes in trenches, there is the possibility that both drummed and loose material has been disposed of at this site. The low permeability of the soils and the fact that asphaltic debris from the site were spread out over a large portion of the northwest corner of the base may make characterization at this site more difficult.

#### Investigation

<u>Geophysical Surveys</u>. As with Site 2, proton precession magnetometry and electromagnetic conductivity techniques will be used to determine the presence and extent, or absence, of buried drums, subsurface plumes, and the perimter of the landfill.

Borings. Once the perimeters and probable hot spots have been determined by geophysics, borings (four shallow and one deep) will be made according to the protocols and approach described for Site 1. Sampling protocol will also be the same.

Monitoring Wells. The borings (five) will be finished as monitoring wells in the same manner as described for Site 1. The groundwater sampling protocol will also be the same.

2.8 HURLWOOD ACQUISITION AND LANDFILL (D-7, HEREIN DESIGNATED SITE 8)

#### Setting

This area was formerly part of the town of Hurlwood, but was acquired by the Air Force in 1978 to provide a buffer zone between runway noise and residential homes in the area (see Figure 2-2). Five covered, inactive drinking water wells are present on the property, as well as an inactive, leveled landfill containing wastes from a cotton gin that used to exist on the site some years ago. Although the Phase I report specified this site as a no-hazard area, the presurvey meeting indicated that the five wells should be sampled.

#### Investigation

Well Sampling. The five wells on the site are reported to have 10-inch casings. It is believed that there are no pumps remaining in these casings, but this has not been confirmed. Hydraulic pumps, or even residual lines, could be a source of oil in these wells. Teninch casing and a water depth estimated at as much as 50 feet (water level at 120 feet above the Ogallala formation at 170 feet) would require very long purge times to remove five well volumes (minimum) when there may be hydraulic oil contamination that will not be removed by the usual purging technique. However, because these sites are lower in priority than the others, it is proposed that sampling proceed with the proper support services provided by Reese AFB as described below.

Opening of the wells (removal of cement slab covers) will require a forklift, grappling chain, and a forklift operator. Removal of piping or dedicated pumps from the wells may require additional forklift time. A tank truck will be required to collect purge water (about 1,000 gallons per well) that will be screened prior to discharge into the Sewage Lake. Assistance by Reese AFB for this equipment is requested.

Sampling of the wells will be done by hand bailer. The well nearest the landfill will be analyzed for priority pollutants, volatile organics, pesticides, dioxin and PCBs, and primary metals, in

addition to the standard measurements for pH, conductivity, total dissolved solids, and temperature. The other wells will be analyzed for purgeable halogenated organics and aromatics (EPA 601/602), TOC, and oil and grease, in addition to tests for pH, conductivity, total dissolved solids, and temperature. Because of the reported presence of cotton gin wastes on the site and all around the area, analysis for arsenic as a primary metal is especially appropriate.

Boring. Because of the suspect security of the water wells presently closed by concrete slabs (one was found broken during the presurvey tour), the very long purge times associated with sampling those wells, the logistics of transporting and disposing of the purge water, and the advantage of gaining boring and groundwater information closer to the landfill site (D-7), a new boring down to the Ogallala formation is proposed. Should the field operations for opening and purging the wells indicate that the approach is not practical or cost-effective, there should be a method to assess the potential for contamination from the landfill, and a boring would provide that opportunity.

The protocols for shallow and deep borings will be combined here. Split-spoon soil samples will be taken every 5 feet down to 50 feet followed by a maximum of five samples down to the Ogallala formation, for a total of 16 samples. Analysis will be run for TOC, TOH, oil and grease, and arsenic.

Monitoring Well. This boring will be finished as a monitoring well with a dedicated pump. The well will be sampled, and the ground-water sample will be analyzed for TOC, TOH, oil and grease, pH, conductivity, total dissolved solids, temperature, pesticides, and primary metals. Surveying of the well will be completed using the protocols described for Site 1.

#### 3. FIELD SET-UP

Following approval of the proposed project plan, E & E will be responsible for ordering, acquiring, and mobilizing all required personnel and equipment to Reese AFB.

The Air Force will be requested to supply a secure building on Reese AFB to which equipment and supplies can be directly sent and stored prior to and during the project. This building will also be used as a central field and equipment maintenance office, and as a sample handling and storage area.

In addition to the building, a secure fenced-in area preferably adjacent to or near the building will be required for storage of the drilling rig and its equipment when not in use.

During the on-site work, equipment and supplies will be staged at the central location prior to being moved to the specific site under investigation. Following the day's activities, all equipment will be returned to the secured storage areas. No equipment will be left unattended at an investigation site.

The actual in-field set-up of equipment at an investigation site will follow E & E's established procedures. Figure 3-1 shows the basic concept of the standard field set-up. Site-specific considerations will probably necessitate some variations. All entry to an immediate work area will be controlled at all times during field activities in order to minimize the potential health and safety risk to both in-field personnel and any observers.

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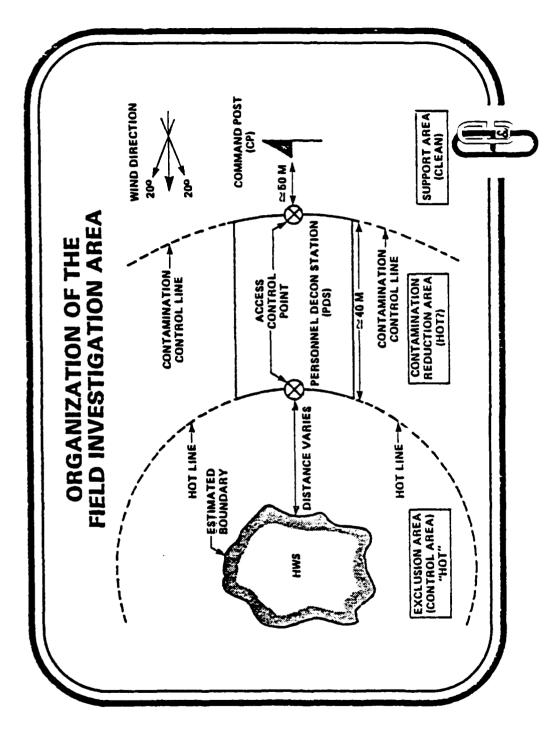


Figure 3-1 ORGANIZATION OF THE FIELD INVESTIGATION AREA

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#### 4. CALIBRATION OF FIELD EQUIPMENT

All field equipment should have been calibrated prior to delivery to the site. However, because of shock received during shipping and handling, the instruments may require either recalibration or an operational check prior to field use. The method and frequency of calibration for each instrument is generally based on such factors as the type of equipment, extent of use, degree of accuracy required, and manufacturer's specifications. Instrument calibration should be certified by documented standards of accuracy, whether performed at E & E headquarters or by outside calibration or repair services. E & E requires that records of calibration dates and standards be maintained for each instrument subject to calibration.

Each piece of equipment requiring periodic calibration or calibration prior to each use must be accompanied by a bound logbook. The logbook will note the instrument's current calibration status with regard to the date last calibrated, instrument settings during calibration, and the initials of the person performing the calibration.

All instruments are to be stored, transported, and handled with care to preserve the equipment's accuracy. Equipment found to be damaged prior to or during use must be taken out of service immediately and cannot be used again until a qualified technician repairs and recalibrates the equipment in question.

#### 5. PREVENTATIVE MAINTENANCE OF FIELD EQUIPMENT

All equipment used by E & E in the field is subject to standard preventative maintenance schedules established by corporate equipment protocols. All equipment is inspected at least twice daily, once before start-up in the morning and again at the end of the work shift prior to overnight storage or return to the charging rack. Regular maintenance such as cleaning lenses, replacement of in-line filters, and removal of accumulated dust is to be conducted according to manufacturer's recommendations and in-field need, whichever is appropriate. All preventative maintenance performed will be entered in the individual equipment's logbook and the site safety logbook.

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In addition to preventative maintenance procedures, daily calibration checks will be performed at least once a day in the morning prior to use and duly recorded in the respective logbooks. Additional calibration checks will be performed as required.

All logbooks will become part of either the permanent site file or the permanent equipment file.

#### 6. FIELD ANALYTICAL PROCEDURES AND DATA REPORTING

All field analytical procedures and sampling at a facility or from the environment may become physical evidence in a legal action. An essential part of E & E's protocols is that the analysis or sample be controlled at all times and thoroughly documented. E & E maintains serialized field data records (FDRs) in the form of individual sheets or bound logbooks. Company analysts record all on-site measurements and field observations in the FDRs, including all pertinent information necessary to explain and reconstruct site operations. Each page of the FDR is dated and signed by all individuals making entries on that page. The leader of the field team on duty is responsible for insuring that the FDR is used during all activities and is stored safely to avoid possible tampering.

In addition to individual field sheets and daily logbooks, project managers must complete weekly summary sheets delineating the past week's activities. All data sheets, logbooks, and weekly summary sheets become part of the permanent site/project file. Figures 6-1 through 6-5 are examples of the weekly summary sheets that will be used.

#### 6.1 CHEMICAL DATA

Chemical field analyses are generally limited to preliminary testing of pH and conductivity and surveying for organic vapors or other hazardous emissions (i.e., HCN, H<sub>2</sub>S, and contaminated dust). All findings are recorded in the site logbook, site safety logbook,

ecol	ogy and environment, inc.
	FIELD ACTIVITIES WEEKLY PROGRESS REPORT
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Contractor(s):	·
Personnel and Outles:	
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Figure 6-1 FIELD ACTIVITIES WEEKLY PROGRESS REPORT

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Amount of Sand, Grovel or Cament Used:	
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Figure 6-2 DRILLING ACTIVITIES WEEKLY PROGRESS REPORT

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EH Survey:			· · · · · · · · · · · · · · · · · · ·
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Other Geophysical Morks			
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*Total hours charged to project	et.		
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Figure 6-3 GEOPHYSICAL SURVEYS WEEKLY PROGRESS REPORT

RESERVED RECORDS

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	Hew Sample was Taken:
	Consents:
	Signature/Date
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Figure 6-4 WATER SAMPLING WEEKLY PROGRESS REPORT

V.P. Technical Services, Project Director, Project Hanager, Project File





# ecology and environment, inc. SOIL/SEDIMENT SAMPLING WEEKLY PROGRESS REPORT E & E Job No.: \_\_\_ Procedures and Types of Equipment for Sampling: A. Sample [.D. and Locations \_\_\_ 8. Sample I.D. and Locations Type of Sample: \_ How Sample was Taken: \_ D. Sample 1.D. and Locations \_ E. Sample I.D. and Locations How Sample was Takens \_\_ F. Semple I.D. and Location: G. Sample 1.D. and Location: cc: V.P. Technical Services, Project Director, Project Manager, Project File 445025

Figure 6-5 SOIL/SEDIMENT SAMPLING WEEKLY PROGRESS REPORT



and field data sheets, if appropriate. Any further chemical analysis conducted in the field would be recorded using the procedures stated above.

#### 6.2 HYDRAULIC DATA

Several techniques are employed in hydrological investigations. These may be employed separately or two or more may be combined, depending on the client's needs and the nature of a particular study. The contract scope of work normally details the procedures to be followed, describes the facilities, and identifies the equipment required to conduct the hydrologic investigations. The degree of calibration necessary and the exact method of documentation are site/project-specific.

Detailed procedures to be used in hydrologic studies during the Phase II Confirmation Study at Reese AFB may include:

- Water sample collection, preparation, and shipment;
- Pump testing;
- Swabbing;
- Surging;
- Limited field analysis of groundwater samples; and
- Determination of water levels.

All data gathered during hydrologic investigations will be maintained in serialized field logbooks or on individual sheets as previously stated. Figures 6-6 through 6-9 are examples of field data sheets which may be used by E & E field personnel.

# 6.3 SOIL BORING DATA

For each boring and well installation, a field log must be completed by the geohydrologist supervising the operation. The completed log describes the operation, identifies any analyses conducted with findings, and provides a graphic description of the geohydrological environment encountered. The field logs become part of the permanent site file and must be kept in a secure location. Figures 6-10 and 6-11 are examples of the typical field log sheets used by E & E personnel.

# DEPTH TO WATER

Well Name/Number _			Date	<del> </del>	
Time (Military) #1_	<del></del>	12	#3	#4	( C.D.T.)
Name of Operator			*		
I.D. of Equipment (	Vehicle or Iron	Horse Nu	mber)		
Date of Last Calibr	ation		To be Cal	ibrated (Date)_	· · · · · · · · · · · · · · · · · · ·
Correction Factor_	·		Measuring Poi	int (MP)	
Land Surface Datum	(LSD) to MP			_(Units)	
Depth to Water (DTW			only 2 are no	0.1% of subseque ecessary) #3   #4	
In reading (1)	<u> </u>	<del></del>			(Units)
Out reading		<del></del>			(Units)
Add or subtract (2) from Out reading					(Units)
Sum of (1) & (2)					(Units)
C2J of 9M					(Units)
DTW from LSD					(Units)
Correction factors of equipment					(Units)
Corrected DTW from LSD					(Units)
Tool used to obtain if transducer, list	OTW (float swip range and seri	tch, magn al number	esium (copper)	screw, transduc	er
Other equipment use make	d (digital mult model_	imeter, r	ecorder, etc.)	List as approp	riate
calibrated					
Procedure number us	ed				
Altitude of MP		(Unit	<u>s</u> ) Altitude of	water level	(Units
Comments		<del></del>	····		
	·····		<del></del>	<del></del>	<del></del>

Figure 6-6 DEPTH TO WATER FIELD LOG SHEET

# MONITORING EQUIPMENT

Well:			
Date:			
Time:		(	Time Reference)
Name of Ope	erator:		
I.D. of 10	gging equip	ment (vehicle) and/	or cable reel No
Serial Num	ber of trans	sducer:	
Range of t	cansducer:	0 to	(Units)
Calibration	n of transdu	ocer:	(mv/ft or mv/m)
Voltage to	transducer	(measured at power	supply output with transducer
attached):	<del></del>		
may be 26.	73 but is or	rinted on data accu	tric pressure (ie barometric pressure isition system as 2.67v. Therefore
		- 50.73 INCHES OF M	ercury:
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Figure 6-7 MONITORING EQUIPMENT FIELD LOG SHEET

Pump Test

	et .	
st/Engineer	Diameter	
ft; Geologi	Open hole Diameter in	ft/ft; Heasuring point is
Test no. Pump setting ft; Geologist/Engineer	ft; Perforated interval	ble correctionft/ft;
Test no.		Pump 1.b, no; Cable correction_
Hole no.	Cased interval	Pump 1.0, no.

Elapsed Lime Water- (minutes)		Vater	-	Water-level measurement (feet or meters).	ent (feet or	meters).	Discharge	Jemp	Coments
Pumping Recovery D/M Below 1.H. Cable (t) MP correction	RECOVETY D/W BA	\$ \$ £	3	J.H. Cable correction	D/W Below Drawdraw LSD	Drawdraw	(rd6)		
		_							
		'							

Figure 6-8 PUMP TEST FIELD LOG SHEET

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	Swat	bing-bailin	g test form	Ho1e	Area
Coserve	d by:		·	Date:	
Hole de	pth	-	diameter	Cased	interval
Perfora	ted interval	s	Tested 1	nterval	
Water 1	evels measur	ed with	······		
Measuri	ng point is		_ which is	below land s	urface.
Static	water level		below mea	suring point.	
BAILING	TESTS				
Тур	e of bailer		length	diameter (	10)
capa	ecity				
SWABBING	S TESTS				
Meti	hod of measu	rement (bar	rel, tank, etc.)		
Tan	k dimensions	: Width	ler	ngthh	eight
Cap	acity: 1 a	·	0.1 =	0.01 =	
Mea	suring point	· <u> </u>	<del></del>		
-	·				
Dep	th Casing se	ıt	Dept	h swabbing from	
Wei	ght of fluid	at end of	cleanout		ft.
Time	Bailer or swab trip no.	Water removed	Depth to water below MP	t', time since dis- charge stopped	Remarks (temperature, color, specific conductance, etc. of sample)
·					
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Figure 6-9 SWABBING-BAILING TEST FIELD LOG SHEET

#### E & E Drilling and Testing Co., Inc. FIELD LOG OF BORING AMD WELL INSTALLATION

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Figure 6—10 FIELD LOG OF BORING AND WELL INSTALLATION (Form 1)

#### E & E Drilling and Testing Co., Inc. FIELD LOG OF BORING AND WELL INSTALLATION

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Figure 6-11 FIELD LOG OF BORING AND WELL INSTALLATION (Form 2)

#### 6.4 SURVEY DATA

All site surveying will be recorded at the time of the work in either the site logbook or a separate bound logbook, and retained in the secured permanent site file. All entries will be made in ink, with errors indicated by a single line through the initial entry followed by the corrected entry and the initials of the person making the correction.

All surveying will be conducted to an accuracy of 0.01 feet  $\pm$  0.005 feet, thus enabling static water level measurements to be used to determine groundwater flow directions.

#### 7. SAMPLE NUMBERING SYSTEM

#### 7.1 PROJECT IDENTIFICATION

Project management is a complex and demanding process that requires an established framework to track a project's progress. E & E has established a Work Breakdown Structure (WBS) management plan which is at the heart of project cost control and tracks a project's progress through the identification of discrete tasks or elements, each with its own specific identification number. The overall project will have a six-digit alphanumeric code called the project number sequentially followed by specific task and subtask codes. All work performed or expenses incurred for the project will be attributed to one of the specific task or subtask codes, thereby enabling easy tracking of the project's progress and cost.

For Reese AFB, specific task and subtask codes will be assigned for the different work segments (i.e., drilling of monitoring wells, sampling of groundwater, etc.) following approval of the work plan and receipt of an authorization to proceed from the Air Force.

#### 7.2 SITE IDENTIFICATION

All environmental monitoring and sampling sites will be identified using the Air Force's standard format of a nine-digit, alphanumeric code consistent with that required for completion of AF Form 2752. The identifier will be made up of the installation code, followed by the sampling site type code and site location number. All documentation for a specific site will include the site identification code for ease of tracking.

# 7.3 SEQUENCE NUMBER

All samples collected during the project will be identified with an eight-digit alphanumeric code consistent with that required for completion of AF Form 2752. All documentation referencing samples taken will be identified using this system. The sample numbers will classify the sample as to the method and type of sample and the calendar year, and will sequentially identify each sample taken.

#### 7.4 SPLIT SAMPLES

If required, sample splits will be obtained, one portion to be retained by the client and one portion to be sent to E & E's Analytical Services Center (ASC) for analysis. Identical sample numbers will be attached to the two (or more) containers and documented in the site logbook. All sample splits will be retained under standard chain-of-custody procedures until they are relinquished to authorized personnel.

#### 7.5 FIELD OC SAMPLES

Additional samples taken in the field are used to evaluate both sampling and analytical methods. The three basic categories are blanks, duplicates, and spiked samples. Field spikes are rarely used because complicated manipulations of measured volumes of solutions are undesirable in the field. General criteria are that there will be one blank sample for each 20 field samples, or for each batch, whichever is smaller. Approximately one in 10 samples will be taken in duplicate. The actual quantities and types of QC samples will be decided by the project manager in consultation with the ASC manager. QC samples will be labelled, preserved, transported, and secured in exactly the same manner as samples (see Sections 12 and 13).

#### Field Blanks

Various types of blanks are used to check the cleanliness of field handling methods. Because field conditions cannot be as rigorously controlled as they are in the laboratory, positive field blank values are not to be subtracted from sample results. It is not possible to set rules for treatment of field blank results which show a degree of contamination. This is the responsibility of the project

manager and the ASC manager, and they will decide to qualify or reject data taking into consideration all factors in a sampling and analysis project. It is possible to design blanks to monitor each and every stage of a sampling exercise: bottle cleaning, sample equipment cleaning, sample collection, transfer to bottles, bottle decontamination, packing, and shipping. Usually, only two types of blanks are used: the transport blank and the field equipment blank (sometimes called the transfer blank or rinsate blank). Field staff may add blanks if field circumstances are such that they consider normal procedures are not sufficient to prevent or control sample contamination, or at the direction of the project manager. Rigorous documentation of all blanks in the site logbooks is mandatory.

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# Transport Blanks

Transport blanks are blank samples designed to demonstrate that the transport of sample bottles to and from the field does not result in sample contamination. One of each type of the prepared bottles to be used during sample collection is filled with pure water, capped, and labelled. The project manager may or may not inform the laboratory that this sample is a blank. If the laboratory is not informed, it is permissible to put false identifying information on the label. If this is done, then the project manager must be responsible for preparation of the final report to the client or agency so that the information on that blank does not show up as a mysterious additional sample. Full documentation must be made in the site logbook.

The blank sample is transported to the site, unpacked, carried into the sampling area, labelled, decontaminated, packed, and shipped back to the laboratory. As far as possible, it should receive the same treatment as a real sample except that the bottle is not opened at any time.

# Field Equipment Blanks

Field equipment blanks are blank samples (sometimes called transfer blanks or rinsate blanks) designed to demonstrate that sampling equipment has been properly prepared and cleaned before field use, and that cleaning procedures between samples are sufficient to minimize cross contamination. If a sampling team is familiar with a

particular site, they may be able to predict which areas or samples are likely to have the highest concentration of contaminants. Unless other constraints apply, these samples should be taken last to avoid excessive contamination of sampling equipment.

Field equipment blanks can be taken before the sampling apparatus is used to collect any samples at the beginning of the day. In this case, the blanks are used to test the initial preparation of the sampling apparatus. The sampler (bailer, split spoon, coliwasa, etc.) is rinsed with pure water (or, in some cases, solvent) and the rinsate is collected and treated as any other sample. Alternatively, or in addition, field equipment blanks can be taken during a sampling run, in which case they serve to test the efficiency of the field cleaning procedures used to prevent cross contamination. The equipment is cleaned in the recommended way, then rinsed with water (or solvent), which is then collected. In either case, it is the responsibility of the project manager and the ASC manager to interpret the results and reject or qualify data accordingly.

# Duplicate Samples

Approximately one in 10 samples will be taken in duplicate. Duplicate samples are identical samples (same place and time, or immediately consecutive) placed in identical containers and treated as normal samples. For the purpose of data reporting, one is arbitrarily designated the sample, the other as the duplicate. Both sets of results are reported (not averaged) to give an indication of the precision of the sampling and analytical methods.

The project manager decides which samples are to be duplicated and whether or not to inform the laboratory. If the project manager wishes to make an assessment of the laboratory's precision without the laboratory's knowledge, the duplicate sample can either be labelled simply "duplicate" or with some false identifying information (e.g., a non-existent monitoring well identification number). In this case it is the project manager's responsibility to assess data quality on the basis of the duplicate results.

#### 8. DRILLING AND INSTALLATION OF GROUNDWATER MONITORING WELLS

#### 8.1 DRILLING

E & E employs a wide range of soil and rock boring techniques, including those using drive casing; both solid- and hollow-stem augers; water, air, and mud rotary and reverse rotary drills; and cable tools. The data requirements for a given well dictate the size and depth of the well, the materials to be used in its construction, and, ultimately, the method of its installation. Table 8-1 lists some available drilling methods and their limitations.

E & E's approach to well drilling and boring design will depend on the specific nature of the past operation, the present data needs, the current environmental setting at each site, and any projected remedial actions. The drilling program will have detailed specifications of procedures and techniques for well and boring location, type, and design; sample collection, preservation, and transportation; analytical procedures; and chain-of-custody control. The use of such specifications will avoid the "hit-or-miss" approach that is typical of less sophisticated programs and will eliminate hidden costs.

Soil samples will be taken every 5 feet (unless otherwise specified by the Air Force) and at every change in strata by driving a 2-inch outside diameter, 2-foot-long split-spoon sampler. Samples will be inspected in the field by a qualified hydrogeologist who will establish site stratigraphy and geologic trends. All field data will be documented in a well log (Figure 8-1) that will be presented to the Air Force. The driller will be required to keep a similar log to serve as a cross-check of the accuracy of the field notes. Representative portions of each sample will be retained in labeled jars.

	Table 8-1
	SOME AVAILABLE DRILLING METHODS AND THEIR LIMITATIONS
Method	Assets and Limitations
Drive casing	Inexpensive and excellent for shallow, small-diameter wells. Vertical samples can be obtain by split-spoon and Shelby tube samplers with re tive ease. Equipment is mobile and can be move to virtually any location. Equipment can be obtained with coring capabilities. However, the method is relatively slow and is limited to abo 100 to 150 feet in depth. A supply of drilling water is necessary. This water is introduced into the boring, thus creating potential crosscontamination or dilution problems. Trouble cabe encountered with boulders and coarse gravel.
Hollow-stem auger	Inexpensive and particularly well-suited to shellow wells in unconsolidated formations. Dr rigs are highly mobile and easy to set up. No drilling fluid or washwater is required. Soil water samples and bedrock cores can be taken through hollow-stem rigs. However, drilling depths are limited to 100 to 150 feet-often lein tight formations or coarse gravels. If boulders are encountered, it is usually necessary to abandon the hole.
Hydraul ic rotary	Fast and well-suited to drilling larger-diameter wells in consolidated and unconsolidated formations. Much greater depths can be attained by this method. Core samples can be collected. In chief drawbacks are the expense, complexity of equipment operation, and difficulty in obtaining undisturbed soil samples. In addition, a supply of drilling water is necessary. This water is introduced into the boring, thus creating potential cross-contamination or dilution problems.
Air rotary	Similar to the hydraulic rotary, this method has the added advantage of not having to use drillin fluids while offering the versatility of being able to use a conventional roller cone bit and m pump. Air rotary is probably the fastest drillimethod available. However, the borehole size generally is limited to eight inches.
Cable tool	Relatively simple to operate and can be employed to drill large-diameter wells in consolidated an unconsolidated formations. Core samples can be collected. However, tends to be slow and drilli water may dilute formation water.
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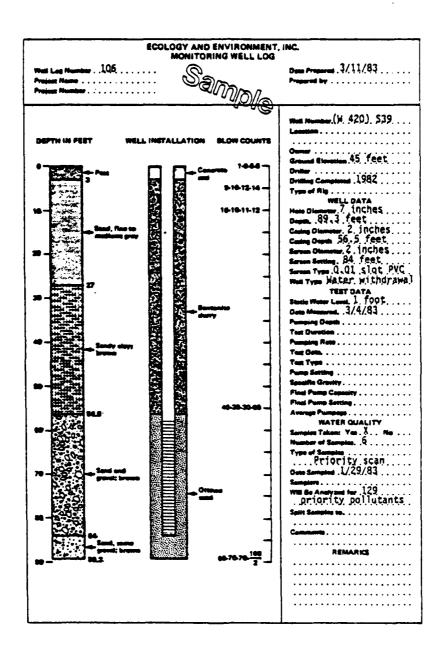


Figure 8-1 SAMPLE MONITORING WELL LOG

Bedrock cores are obtained by the use of diamond-tipped core barrels. All cores will be retained for future study, which may include microscopic examination of rock thin sections under a petrographic microscope to determine rock type, extent of microfracturing, and the like. Knowledge of these properties could aid team hydrogeologists in assessing the likelihood of the bedrock regime's acting as a conduit for off-site migration of contaminants. All drilling and boring will be conducted with strict adherence to ASTM standards, if applicable.

If drilling is conducted in areas suspected of being contaminated by volatile organics, samples of drilling spoils will be collected and placed in 50-mL vials with Teflon-coated septa. "Head-space" samples will be withdrawn and field-screened, using a Century Model 128 OVA, to estimate total volatile organic contamination. These data subsequently will be used to help delineate the vertical extent of contamination, establish the interval over which the well will be screened, and help characterize the contamination in order to determine the level of respiratory protection required on-site.

Stringent safety regulations will be adhered to by all E & E personnel and subcontractors. An in-depth description of the E & E corporate health and safety program, which will be followed by personnel working on Air Force projects, can be provided upon request.

#### 8.2 SOIL SAMPLING

Soil samples will be taken at 5-foot intervals or, if warranted, on a continuous basis using split-spoon samplers. Shelby tube samples of undisturbed soil will be obtained for laboratory analysis of parameters such as hydraulic conductivity, shearing strength, and porosity. Bedrock will be obtained using diamond-tipped core barrels. The bedrock cores may be taken to the depth at which the well will be screened.

As soil samples are taken from the split spoon, an OVA will be used to "sniff" them for the presence of organic vapors. Samples will be forwarded to E & E's ASC for additional evaluation, either as composite or discrete samples.

All soils will be classified on-site by a geologist using the Unified Soil Classification Scheme.

Each containerized soil sample to be used in a composite will be sieved through a No. 8 mesh screen to remove stones and debris. Screening will be accomplished using a Teflon scraper to force material through the screen. This insures that the sample weight is not distorted by stones and debris with respect to any compound that may be present. The screened sample will then be weighed and returned to its original container for storage until all soil samples have been screened. The weight of the screened samples will be recorded for future use.

A portion of each screened sample will then be weighed to provide equal portions for the homogenization step. The weighed portions will be mixed thoroughly in a prepared 16-ounce sample bottle using a spatula. A homogeneous mixture will be attained by stirring the sample at least 10 to 15 times. The mixed sample will then be placed on a Teflon sheet and shaped into a rectangular form of even thickness. The rectangle will then be quartered: two diagonal quarters will be combined as the client composite; the alternate diagonal quarters will be combined as a storage composite. For storage, the composites will be placed in prepared containers, sealed, and accompanied by appropriate sample control records. The storage composites will be held at the ASC in a secured storage area until the project is complete.

The soil composites for volatile organic analysis will be prepared in the following manner. During field operations, a portion of each soil sample will be placed in a 40-mL borosilicate vial. Equal portions of soil will be removed from each vial and placed in the composite vial. The composite samples will then be mixed quickly and the vial sealed.

More detailed soil contamination data will be required if soils contaminated with hazardous materials are to be excavated and removed to approved disposal facilities. For this type of investigation, the surface of the disposal site will be surveyed and gridded into areas of approximately 1,000 square feet. (Grid size may vary, depending on the nature of the site and underlying soils.) A borehole will be installed at the center of each grid square; soil samples will be taken at the ground surface and at 5-foot intervals until the appropriate depth has been reached. This depth may vary from as

little as 5 feet in areas underlain by compact clays to as much as 100 feet in areas underlain by coarse sand and gravel. The result of this type of study is a three-dimensional representation of the soil beneath the site to the appropriate depth, with contaminant data for each block.

Surface water drainage channel soil samples will be taken to a depth of 12 inches, typically at 50-foot intervals, to a distance of 150 feet from the site boundary along each channel.

#### 8.3 MONITORING WELL CONSTRUCTION AND COMPLETION

Upon completion of the borehole, team hydrogeologists will supervise the installation of the monitoring well(s). The type of materials used in well construction will vary according to data requirements. For example, in a shallow, unconsolidated glacial aquifer contaminated by volatile organic contaminants, the project team normally would specify 2-inch diameter PVC pipe with threaded joints. If contamination by certain ketones or aromatic compounds is suspected, it may be necessary to specify stainless steel casing in order to eliminate potential chemical reactions that could occur if PVC were used. A Johnson-Keck submersible pump would be specified for purging and a Teflon bailer would be specified for sampling. Other variables could include the length of well screen, screen slot size, type of backfill to be used, type and length of seal or grout, and type of well security to be used. All variables will be considered carefully and the best design for the job will be presented to the USAF-OEHL project engineer for approval.

Figure 8-2 shows three alternative types of monitoring wells, each designed to address a different set of data requirements:

- <u>Fully screened wells</u> are used to enable the hydrogeologist to obtain a composite sample of groundwater to establish compliance points and detect the presence of any aquifer contamination. Their use also is recommended in conducting pumping tests to obtain accurate measurements of aquifer response.
- Bedrock wells enable selective sampling of the bedrock aquifer in order to measure groundwater quality and to evaluate the interaction between bedrock and unconsolidated aquifers.



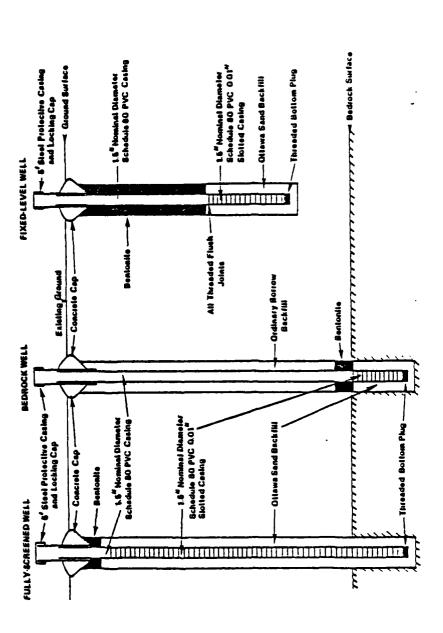


Figure 8-2 TYPICAL DETAIL OF MONITORING WELLS

• <u>Fixed-level wells</u> are utilized to take isolated samples from individual strata suspected of containing contaminated ground-water. These wells also can provide an early warning system to detect the movement of contamination into isolated, pollutant-free aguifers. Great care will be taken to preclude the possibility of cross-contamination of aguifers by carefully reviewing geologic and geophysical data, conducting field analyses of soil samples for contamination, and the placing of grouting material at confining layers.

When drilling in a potentially contaminated environment, it will be necessary to collect and dispose of drilling spoils and washwater and to dispose of or properly decontaminate protective equipment. Furthermore, to prevent cross-contamination between wells, it will be imperative to decontaminate all drilling equipment between wells (see Section 11.1). This may necessitate steam cleaning the equipment, rinsing it with a solvent, and then subjecting it to a second steam cleaning. Subject to all pertinent local, state, and federal regulations, decontamination wastes will be containerized and all contaminated wastes generated on-site subsequently will be removed to an approved disposal facility by a licensed hazardous waste hauler.

Unless otherwise specified, E & E will design all wells as permanent sampling locations. Therefore, care will be taken to locate the wells so that they may be incorporated into future monitoring and remedial operations. Concrete caps and protective, lockable steel casings will be installed around each well, thus reducing the possibility of vandalism while insuring sample integrity.

All well casing top elevations will be surveyed to an accuracy of  $\pm 0.01$  feet, thus enabling static water level measurements to be used to determine groundwater flow directions.

All drilling operations, installation procedures, sampling data, and waste disposal operations will be fully documented in bound field books to assure that the highest degree of care has been taken in completing all required work.

#### 8.4 WELL DEVELOPMENT

At least 48 hours after internal mortar placement, the monitoring wells will be developed according to procedures prescribed in Appendix E of the Solicitation. Well development will be conducted using either a submersible pump, airlift methods, or a bottom discharge bailer, with or without a surge block. The wells will be drilled without the use of drilling fluid and a minimum of five times the amount of the standing water volume in the well, including the well screen, casing, and saturated annulus (assuming 30% porosity), will be removed. Wells will be developed until the well water is clear to the unaided eye, the sediment thickness remaining in the well is less than 5% of the screen length, and the five well volumes (described above) have been removed.

Well development also will include washing the entire well cap and the interior of the well casing above the water table using only water from that well. The result of this operation will be a well casing that is free of extraneous material (grout, bentonite, sand, etc.) inside the riser, well cap, and blank casing between the top of the well casing and the water table. This washing will be conducted before and/or during development, not after development.

The following data will be recorded as part of well development:

- Well designation:
- Date(s) of well installation;
- Date(s) and time of well development;
- Static water level from top of well casing before 24 hours after development;
- Ouantity of water lost:
  - During drilling and
  - During fluid purging;

- Ouantity of fluid in well prior to development
  - Static water level and
  - Contained in saturated annulus;
- Field measurement of pH before, twice during, and after development;
- Field measurement of specific conductance before, twice during, and after development;
- Depth from top of well casing to bottom of well (from diagram);
- Screen length (from diagram);
- Depth from top of well casing to top of sediment inside well, before and after development:
- Physical characteristics of removed water, including changes during development in clarity, color, and particulates;
- Type and size/capacity of pump and/or bailer used;
- Description of surge technique, if used;
- Height of well casing above ground surface; and
- Ouantity of fluid/water removed and time of removal.

The water removed from a well during development will be stored on-site in bulk containers or drums for proper disposal if the water is contaminated.

#### 8.5 GEOPHYSICAL LOGGING

All boreholes for monitoring wells will be ceophysically loaded for the purpose of cataloging and correlating lithology and stratigraphy. Because the boreholes will be drilled without the use of drilling fluids, it is recommended that calibrated nuclear loos, such as neutron and gamma-gamma, along with natural gamma loos, be used. Electric logs, such as spontaneous potential and resistivity, cannot be run due to the lack of drilling mud and, although there may be some water in the drill hole, it is not anticipated that the water height will be sufficient to allow meaningful surveys to be performed. Nuclear logs will supply information pertaining to lithology, stratigraphy, total porosity or bulk density, and moisture content. The advantage of these logs is that they can be used in either cased or uncased boreholes. As a cost-saving benefit, E & E recommends that all geophysical logging be performed upon completion of all well construction, to minimize standby costs.

Table 8-2 contains a summary of log applications that may be used for this project, and the types of information that may be obtained from each.

Table 8-2
SUMMARY OF LOG APPLICATIONS

Required Information	Widely Available Logging Techniques that Might be Used
Lithology and stratigraphic correlation of aquifers and associated rocks	Electric, sonic, and caliper logs in open holes; nuclear logs in open or cased holes
Total porosity or bulk density	Calibrated sonic logs in open holes; calibrated neutron and gamma-gamma logs in open or cased holes
Location of water level or saturated zones	Electric, temperature, and fluid conductivity in open holes or inside casings; neutron and gamma gamma logs in open holes or out- side casings

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# 9. AQUIFER TESTING

The movement of groundwater and any associated contaminant plume through an aquifer is controlled by the physical characteristics of the medium and the hydraulic head gradient. Changes in the potentiometric surface caused by the pumping of local wells can be evaluated to determine formation permeabilities, specific yield, drawdown, and extent of cones of depression. All of these properties are important in assessing the potential impact of a contaminant plume on local groundwater quality. Artificial changes in the hydraulic head caused by withdrawing water from the aquifer can locally distort the potentiometric surface and alter the flow direction of a contaminant plume. Proper placement of a pumping well may locally lower the water table, effectively isolating a potential source of contamination from contact with the groundwater. A pumping well situated in a contaminant plume can be incorporated into a remedial action plan to remove the contaminated water for treatment purposes. A pumping well also can be used as a diagnostic tool to determine the hydraulic connection between adjacent aguifers in order to aid in the siting of proposed landfills, lagoons, and waste storage sites.

By interpreting the aquifer response to any of a variety of field tests, E & E hydrogeologists infer data pertaining to transmissivity, storativity, and boundary conditions, as well as data pertinent to the movement and extent of contaminant plumes.

Existing wells will be used whenever possible to reduce project costs. Generally, a well diamater of at least four inches will be needed. Three or more observation wells usually will be specified.

The wells will provide the water table data for varying distances from the pumping well, which will be used to determine the size and shape of the cone of depression and the aguifer transmissivity.

E & E will supervise the design and installation of suitable wells. Pumping wells will be of sufficient size to accommodate standard submersible pumps and generally will be screened over the entire saturated thickness of the aquifer. Observation wells will be sited to provide the data thought to be necessary and will be screened in the proper strata to accurately gage the aquifer response to pumping.

Normally, a pumping test will be conducted as a 72-hour step-drawdown test. E & E personnel will monitor the wells for the full duration of the test (discharge rates will be measured by a free discharge pipe orifice or by a commercially available flow meter). Hydrogeologists will evaluate the data using type curves for both time-drawdown and distance-drawdown solutions. The methodologies pioneered by C.V. Theis in 1935 will be used to analyze confined aquifer situations; the methodologies developed by S.P. Neuman in 1975 will be used to analyze unconfined aquifer systems.

When pumping tests are conducted in contaminated environments, periodic sampling will be conducted to enable E & E hydrogeologists to assess changes in pollutant content and to determine the effects of pumpage on the contaminant plume. The discharge of contaminated groundwater generated by a pumping test may need to be contained or may require a National/State Pollutant Discharge Elimination System permit from the appropriate regulatory agency if it is discharged to a sewer or to a body of surface water. E & E will assist in the acquisition of any required permits.

On a smaller scale, individual piezometer wells can be used to conduct <u>in-situ</u> permeability tests. Such tests involve creating an instantaneous head change in the piezometer and then recording head recovery versus time as the water level gradually returns to its static condition. <u>In-situ</u> permeability tests are of two types: "slug" tests, in which a volume of water is instantaneously added, and "bail" or "pump" tests, in which a volume of water is instantaneously removed. The method that E & E most commonly uses to interpret these

data and derive a permeability number is the method of Hvorslev\*, which uses time/head-change data to graphically calculate a factor,  $T_0$ , "basic time lag." Then, for a piezometer screen length of L, a sandpack radius of R, and a well casing radius of r, the permeability, K, is defined as:

$$K = \frac{r^2 in (L/R)}{2L T_0}$$

The computation of K for each piezometer allows a hydrogeologist to compute the actual rate at which the groundwater (and thus contaminants) leaves the site by applying the following version of the common Darcy equation for groundwater flow:

$$Q = KiA$$

where Q is groundwater discharge; K is permeability; i is hydraulic gradient (derived from piezometer water levels); and A is cross-sectional area perpendicular to flow.

A typical aquifer test will include collection of background data for siting purposes, installation of a discharge well and three observation wells, monitoring to establish background conditions, performance of a 72-hour pump test, and interpretation of the results.

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<sup>\*</sup>Hvorslev, M.J., 1951, "Time Lag and Soil Permeability in Groundwater Observations," United States Army Corps of Engineers, Waterways Experiment Station Bulletin 36, Vicksburg, Mississippi.

#### 10. GROUNDWATER MONITORING AND SAMPLING

#### 10.1 GROUNDWATER LEVEL MEASUREMENT

Water levels will be measured at all monitoring wells and surface water staff gaging stations on a monthly basis. Work will be performed in accordance with established safety requirements by either contractor or subcontractor personnel. All measurements will be taken to within 0.01 foot.

The top of the interior casing of all monitoring wells will be marked at one point, which will be surveyed to determine its elevation. The depth of the water table below the top of the casing will be determined by a steel tape or electric water level indicator. All equipment will be decontaminated between wells to prevent cross-contamination.

# 10.2 SURVEYING OF WELLS

Following completion of the installation of the final well, each installed well location will be surveyed to determine map coordinates (Univeral Transverse Mercator, State Planar, or latitude/longitude) to within one meter and entered onto a site map. Elevations of both the ground surface and the top of the well riser will be surveyed to within 0.01 foot ( $\pm$  0.005 foot if possible) using the National Geodata Vertical Datum of 1929. These data will become part of the permanent site file.

#### 10.3 ON-SITE ANALYSIS

Groundwater sampling and analysis will involve the following steps:

- Measurement of the static water level:
- Purging of several well volumes;
- Acquisition of the sample;
- On-site analysis: and
- Off-site analysis (see Section 10.4).

Before any water is drawn from a well, the static water level depth from the top of the casing is measured, then the well is purged. If the well can be completely dewatered, the purging process consists of removing a volume equivalent to twice the volume of the standing water originally contained within the monitoring well plus the surrounding sand or gravel pack, if present. If the well cannot be dewatered (because the specific yield is relatively large), the purging consists of the removal of at least five standing volumes (possibly more, depending on the results of pH and specific conductivity testing conducted on the purge water in time series). The values are time plotted and the purging process is considered complete when the values have stabilized. In most cases, a submersible pump is used to accomplish this purging. The most versatile pump of this type is the small-diameter stainless steel Johnson-Keck pump, which is battery operated and small enough to fit into two-inch diameter wells.

To avoid sample cross-contamination, E & E uses bailers constructed of Teflon, PVC, or stainless steel. Each bailer is thoroughly decontaminated before it is used in the next well. Bailer size depends on the requirements of each project. The bailers are constructed of Teflon-extruded, heavy wall tubing and are plugged at the bottom with a short length of Teflon-extruded rod (no glue is used). Water enters the bailer both from the open top and from the bottom through a 3/4-inch hole. It is prevented from flowing out of the hole by a one-inch glass marble, which rests in a conical seat machined into the top of the plug.

On-site analysis is generally restricted to pH, conductivity, and surveys for organic vapors. pH and conductivity are routinely checked during purging operations to determine steady-state conditions between the water within the well column and the existing groundwater. In areas of potential contamination, a flame ionization or photoionization instrument is routinely used to survey the groundwater during

nunging and the water samples for organic vapors in order to determine

# 10.4 SAMPLING FOR OFF-SITE ANALYSIS

the potential health hazards.

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Sampling of groundwater for off-site analysis is conducted in the same manner as sampling for on-site analysis as described in Section 10.3, with the addition that the water samples are containerized and shipped to an outside laboratory for analysis as described in Sections 12 and 13.

#### 11. DECONTAMINATION PROCEDURES

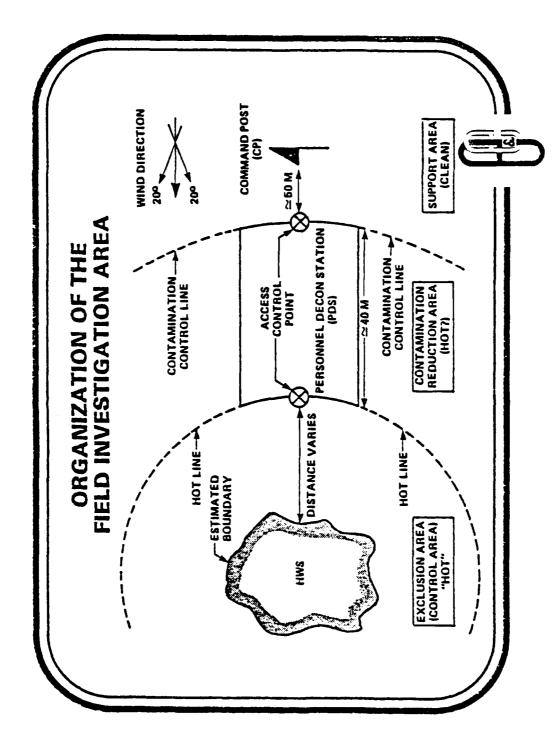
Decontamination of personnel and equipment is an important element of site safety operations. Proper decontamination prevents sample cross-contamination and contamination of personnel, vehicles, and the public; moreover, it supports quality control. Decontamination at the site involves the use of field decontamination stations for personnel, equipment, and clothing.

The decontamination process is designed to control the spread of contaminants to clean areas by physically removing or chemically neutralizing the contaminants. The following subsections delineate the basic decontamination processes for various pieces of field equipment and describe a sample personnel decontamination set-up for a Level B or C site. The actual decontamination layout is generally site-specific but would include most, if not all, of the described stations. A Level D site would involve less protective clothing and fewer stations.

Decontamination procedures normally take place in the contamination reduction area (see Figure 11-1). In this area, all equipment which entered the site is cleaned prior to moving off-site and outside of the contamination control line. Table 11-1 identifies various decontamination wash solutions which can be used depending on the site-specific hazards encountered.

11.1 DRILLING, SOIL SAMPLING, AND MONITORING WELL INSTALLATION

Prior to use in the field, and between sampling locations, all
equipment, including the full auger rig and all auger flights, will be



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Figure 11-1 ORGANIZATION OF THE FIELD INVESTIGATION AREA

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Table 11-1 USE OF GENERAL PURPOSE DECONTAMINATION SOLUTIONS

	Decon Solution	Mixing Solutions	Use s/Remarks
i i	An aqueous solution contain- ing a low-sudsing detergent	Follow the mixing instructions written on the particular product label	Generally has the widest range of use; best choice on sites where contaminant is unknown or a wide range of contaminants exists
<b>.</b>	An aqueous solution containing 5% sodium carbonate $(\mathrm{Na}_2^{C}(\mathfrak{J}_3))$ washing soda	to 10 gallons of water, add four pounds of sodium carbonate	Decon solution of choice for base labile compounds such as the organophosphate pesticides; effective in neutralizing inorganic acids; since sodium carbonate is a water softening agent, this characteristic is an aid in physical removal of contaminants.
ن.	An aqueous solution contain- ing 5% sodium bicarbonate (NaHEO <sub>3</sub> ) baking soda	To 10 gallons of water, add four pounds of sodium bicarbonate	Sodium bicarbonate is amphoteric and can be used to neutralize either base or acid contaminants; good decon for base labile compounds
o.	An equecus solution containing 2% trisodium phosphate (Na $_{ m J}$ PO $_{ m Q}$ ) (TSP)	To 10 gallons of water, add approximately two pounds of trisodium phosphate	See uses/remarks for decon solution B above
u.	An aqueous solution containing 10% calcium hypochlorite ( $\operatorname{CaCl}_20_2$ ) (HTH)	to 10 gallons of water, add eight pounds of calcium hypochlorite	Cyanide salts
	<ul><li>f. Ethylenediaminetetra-acetic acid (EDTA, versene, sesque- atrene)</li></ul>	Commercial product; follow product label	EDIA is a chelating agent and is the decon solution of choice for heavy metal contaminants
<b>:</b>	An aqueous solution containing 3 to 5% citric, tartaric, oxalic acids or their respective sodium salts	To 10 gallons of water, add four pounds citric, tartaric, or exalic acid	These compounds are chelating agents and are the decon solution of choice for heavy metal contaminants

decontaminated using the following cleaning procedures. At least 200 feet of auger will be dedicated to the rig prior to the initiation of drilling. Drilling will be carried out on a plastic tarp pad, nominally 20 by 20 feet. Drill cuttings will be collected on the pad during drilling. Once a hole has been completed, the used augers will be fully cleaned on the pad and the washings will be collected in the cuttings on the pad. The cleaned augers will be returned to the working rig.

The equipment washing procedure is as follows:

- The auger flight will be steam-cleaned.
- The auger flight will be fully rinsed with methanol, an organic solvent that is easily volatilized, is not a priority pollutant, and therefore cannot introduce extraneous contamination to the site.
- The auger will be thoroughly rinsed with distilled water and allowed to air-dry.

All soil sampling equipment including split spoons, stainless steel spatulas, screens, and pans will be decontaminated by washing in laboratory-grade detergent, rinsing three times with tap water, rinsing with either pesticide-grade acetone or methanol, and then rinsing with ASTM Type I water. The equipment will be air-dried prior to repeated use. If weather conditions or other factors prohibit air-drying, the equipment will be dried in an oven at 105°C for 15 minutes and allowed to return to room temperature prior to use.

# 11.2 WELL DEVELOPMENT AND ADUIFER TESTING

All equipment used during well development and aquifer testing will either be cleaned/decontaminated or new prior to placement into the well. Equipment such as submersible pumps will be thoroughly decontaminated using the procedures identified in Section 11.1 Several items such as monofilament line, rope, and tubing purchased new will be rinsed with ASTM Type I water.

each well, the equipment removed from the series of the series of contaminated and subject to the same cucorfamination brokess or recarded prior to use in another well.

#### 11.3 WATER LEVEL MEASUREMENTS

Water level measurements will denerally be taken using a steel tape or electronic water level indicator. All equipment entering the well will be washed and rinsed prior to insertion into the well according to the procedures specified in Section 11.1. Hoon completion of the measurement at each well, the equipment will be subjected to the same decontamination process prior to use on any additional wells in order to prevent cross-contamination.

#### 11.4 WATER SAMPLING

Water sampling equipment (pumps, bailers, glass sampling jars, etc.) will be cleaned prior to use in any sampline work according to the procedures described in Section 11.1. Following completion of sampling at a specific point, all equipment will be subjected to the same decontamination process to prevent cross-contamination between sampling points.

#### 11.5 SEDIMENT SAMPLING

Sediment sampling equipment such as stainless steel scoops, sieves, augers, split spoons, and dredges will be subjected to the same decontamination procedures as other field equipment both prior to and immediately following use at each sampling site.

#### 11.6 PERSONNEL DECONTAMINATION

Avoidance of contamination is the first and best method for preventing the spread of contamination from a hazardous site. Every effort should be made to prevent direct contact with the contaminant. Careful planning, knowledge of the contaminant, and attention to where one puts one's hands and feet are all important. Simple common-sense rules of contamination avoidance include not sitting down, not leaning against drums or debris, and not putting equipment on the ground.

No one should enter a site alone, though all tasks should be accomplished with as few team members as possible. Thus, exposure is limited to a minimum number of team members, and the ultimate process of decontamination is simplified.

The first step in the decontamination process may well take place while the team is still on or just off the hazardous site but still in the exclusion area. This is especially true if there is known heavy ground contamination. In areas of spills or heavy leachate runoff, the protective boots will become heavily contaminated. As the team leaves these areas en route to the personnel decontamination station (PDS), a boot rinse with a detergent solution (from a pre-positioned container) will significantly reduce the spread of contamination along the egress route.

The PDS will be established within the contamination reduction area upwind of the hazardous substance site. The PDS will be located between the hot lire (upwind boundary of the exclusion area) and the support (clean) area boundary. Figure 11-1 illustrates the organization of the field operations area.

The PDS provides a controlled decontamination and undressing system designed to avoid the transfer of chemical contamination from protective clothing or equipment to the individual. It must be established before the team enters the contaminated area so that members can immediately and safely cope with an emergency. Team members must be briefed on decontamination procedures prior to entering the contaminated area. When the team leaves the area, extreme care must be taken to insure that proper decontamination is performed. Failure to observe these procedures could result in personal injury.

# 11.6.1 Organization and Operation of the Personnel Decontamination Station (PDS)

The project team leader must exercise professional judgment in determining how the PDS will be organized and what decontaminants will be used. Factors he must consider include:

- The extent and type of hazard expected;
- Explosive potential:
- Meteorological conditions:

- Topography:
- Levels of protection selected; and
- Availability of equipment and supplies.

This section describes the layout of a PDS for personnel dressed in Levels B and C protection.

### Set-up for Levels B and C Decontamination

Figure 11-2 illustrates a PDS designed to support personnel working in Level B or Level C protection. The following is a description of the PDS layout by station.

- Station A Equipment Drop: A plastic ground sheet on which field equipment is placed by returning members of the work party.
- Station B Decontamination of Outer Garments: A wash tub filled with the appropriate decontamination solution.
- Station C Rinse of Outer Garments: A wash tub filled with a water rinse.
- Station D Boot Removal: A bench or stool for personnel to sit on during removal of the boot covers; and a plastic-lined container for disposal of booties.
- Station E Glove Decontamination and Rinse: A portable table containing a small bucket of decontamination solution and water rinse.
- Station F Boot Decontamination and Rinse: A small bench or stool for personnel to sit on during decontamination; a wash tub containing the appropriate decontamination solution; a wash tub containing a water rinse; and a small can for disposal of masking tape.



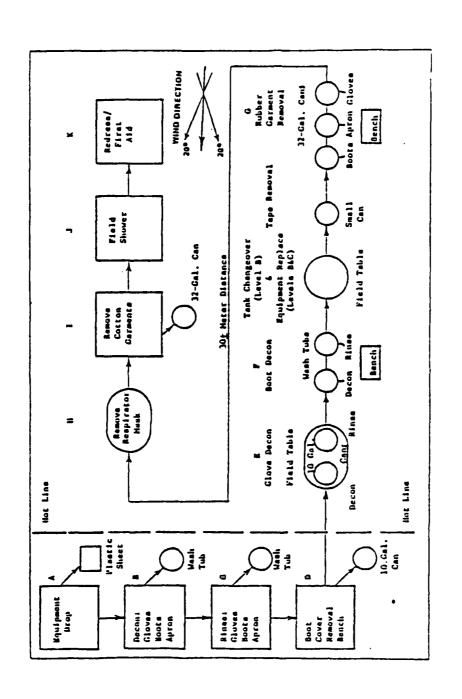


Figure 11-2 TYPICAL LAYOUT OF PDS FOR LEVEL B AND C PROTECTION

- Station G Root and Outer Garment Removal: A bench or stool to sit on during removal of boots, aprons, and gloves; and three 32-gallon plastic-lined containers for segregating boots, aprons, and gloves.
- Station H Removal of Respirator: A portable table approximately 30 meters upwind from Station G on which the self-contained breathing apparatus or air-purifying respirators are placed.
- Station I Removal of Cotton Garments: A 32-gallon plasticlined container for disposal of all cotton garments.
- Station J Field Shower (Optional): A field shower set-up. If impractical or not available, a wash point (container of water, soap, and paper towels) should be provided.
- Station K Redress and First Aid (Optional): A location to redress and render first aid as necessary. This station separates the contamination reduction area from the support (clean) area.

#### Levels B and C Decontamination Equipment and Procedures

Station A. Equipment such as instrumentation, sample jars, and sampling devices removed from the hazardous site should be placed on the equipment drop at this station. The plastic sheet used for this purpose is positioned on the downwind side of the hot line just inside the exclusion area. Equipment should be decontaminated by PDS operators only after all work party members have been processed through the PDS. Gross contamination can be removed from equipment either by carefully stripping off protective covers such as plastic bags or through a wash process using an appropriate decontamination solution and water. Protective covers which are removed from the equipment can be placed in the same container as the disposable booties at Station D. Equipment should be thoroughly decontaminated before taking it across the hot line.

- Station B. This station is the initial and most critical step in the personnel decontamination process. The individual being decontaminated should be directed to stand in the wash tub while the PDS operator, using long-handled brushes, carefully decontaminates all outer rubber garments. Care should be exercised when decontaminating personnel wearing Level B and Level C protection to avoid splashing with decontamination solution.
- Station C. This station is a rinse station. Again, the individual being decontaminated should be directed to stand in the wash tub. Care again must be exercised in rinsing the rubber garments.
- Station D. Prior to crossing the hot line, the work party member should remove disposable booties and place them in the receptable located at this station.
- Station E. At this station, work party members will decontaminate and rinse their gloves. A field table is recommended to elevate the decontamination and rinse solution to waist height.
- Station F. Work party members will sit on the bench provided while PDS operators will sequentially decontaminate and rinse the boots. The small container located between Stations F and G is used to dispose of all used masking tape.
- Station G. Work party members will sit on the bench provided and sequentially remove their boots, apron, and gloves.
- Station I. The individual will remove all cloth undergarments such as coveralls, socks, and underwear, and place them in the container provided.
- Station J. This station is a field shower facility. If a shower is not available, personnel should as a minimum wash their hands and faces before leaving the site. Personnel should be instructed that a shower is required to complete the decontamination process.

Station K. After showering, work party members will redress into clean clothes and receive first aid (e.g., treatment of minor cuts and bruises), if required. The individual then leaves the PDS and moves into the support area.

## 11.6.2 Preparation of Decontamination Solutions

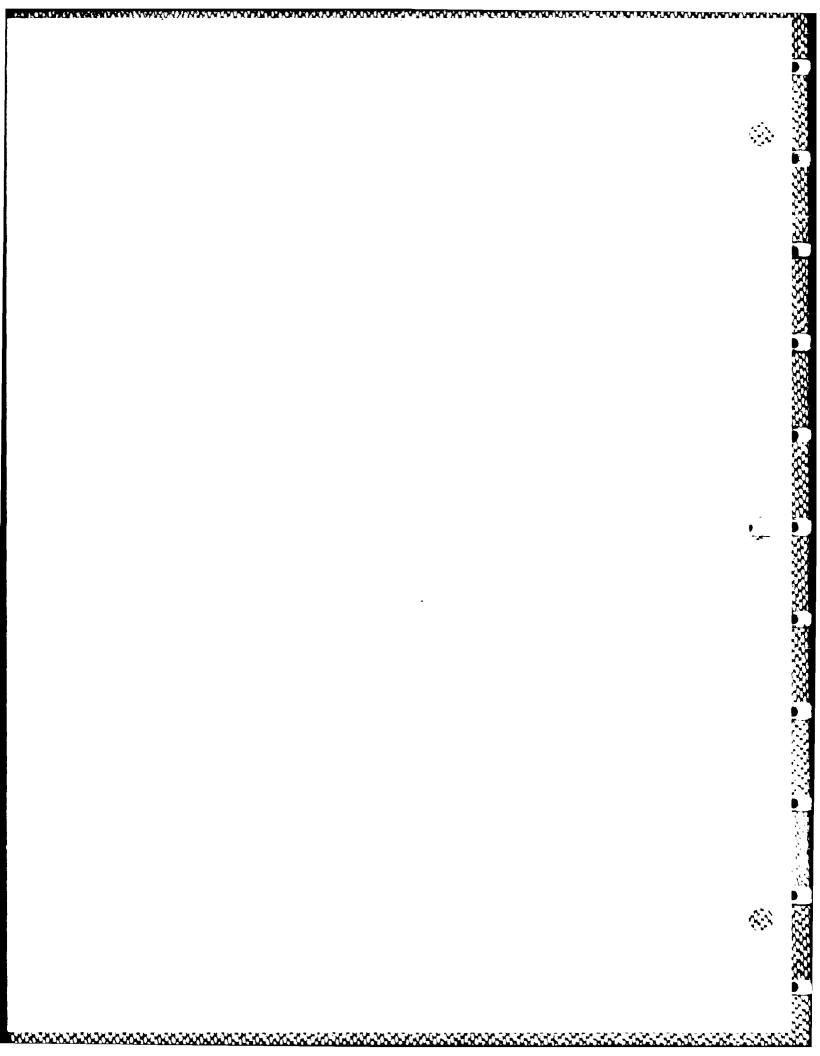
Ideally, the decontamination solution used should react with and chemically neutralize the contaminants found at a hazardous substance site. However, since the contaminants on a particular site will be unknown in most cases, a decontaminant is more often chosen based on its ability to physically remove (dissolve or suspend) the contaminant in question.

In all decontamination operations water is a recommended solvent. Organic solvents dry the skin and are often more toxic than the hazard one is trying to eliminate. These solvents also accelerate the deterioration and penetration of protective clothing. Water, on the other hand, does not damage protective clothing and does not contribute to secondary contamination.

It must be recognized that there are no universal decontaminants and the project team leader will often be required to make a professional judgment regarding this matter. Table 11-1 lists chemical mixtures suggested as readily available general-purpose decontaminants. Their application and instructions for preparation are also presented in the table.

#### 11.6.3 Closure of the PDS

When the PDS is no longer needed, it should be closed down by the PDS operators. All disposable clothing and plastic sheeting used during the operation should be double-bagged and either contained onsite or removed to an approved off-site disposal facility. Decon and rinse solution could be discarded on-site or also removed to an approved disposal facility. Reusable rubber clothing should be dried and prepared for future use. (If gross contamination has occurred, additional decontamination of these items may be required.) Cloth items should be bagged and removed from the site for final cleaning. All wash tubs, pails, containers, etc., should be thoroughly washed, rinsed, and dried prior to removal from the site.



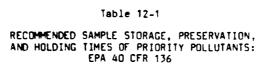
#### 12. SAMPLE HANDLING AND PACKING

#### 12.1 SPLIT SAMPLE PROCEDURES

When split samples are requested, identical sample tags will be attached by E & E personnel to the two (or more) containers. The E & E sample will be clearly marked as such and treated in accordance with normal procedures. Any other split samples will remain subject to chain-of-custody procedures until they are relinquished to the person requesting them. E & E personnel also may be required to comply with the custodial procedures preferred by the person requesting the split samples; these procedures will be complied with on a case-by-case basis. All split samples will be documented in the site logbook.

### 12.2 SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

In order to preserve sample integrity either for physical, chemical, or biological analyses as well as to have a sufficient volume of each sample for analysis, all samples will be collected in the appropriate containers, preserved when required, and stored at the appropriate temperature. Various sample containers (e.g., glass, plastic) and container sizes will be used, depending on the specific analyses required. Table 12-1 lists the sample containers, preservatives, and holding times to be used to analyze for the priority pollutants listed in 40 Code of Federal Regulations (CFR) Part 136. Table 12-2 lists the sample bottles to be used, the volumes, the preservatives, and the holding times for biological parameters, physical parameters, metals, inorganic and nonmetallic compounds, and organic compounds. All of the listed sample containers, preservatives, and holding times in the tables are approved and/or recommended by EPA.



Parameter	Container*	Preservative	Holding Tim
Purgeable halocarbons	A	4°C	7 days
Purgeable aromatics	A	4°C	7 days
Acrolein acrylonitrile	A	4°C	7 days
Phenois	В	4°C	**
Benzidines	В	4°C	**
Phthalate esters	В	4°C	**
Nitrosamines	8	4°C	**
Organochlorine pesticides and poly- chlorinated biphenlys (PCBs)	В	4°C	**
Nitroaromatics and isophorone	В	4°C	**
Polynuclear aromatic hydrocarbons	8	4°C	**
Haloethers	В	4°C	**
Chlorinated halocarbons	В	4°C	**
2,3,7,8-tetrachloro-dibenzo-p-dioxin	В	4°C	**
Purgeables	A	4°C	7 days
Base/neutrals, acids, and pesticides	В	4°C	
EPA 40 CFR 141: Trih	alomethanes (THM	() (Drinking Water)	
Tap water***	A	4°C	14 days
Open body	A	4°C	14 days

#### Key:

- 40-mL clear screw-cap septum vials plus caps with 22-mm Tuf-Bond Teflon silicone
- 1/2-gallon amber glass bottle with Teflon-lined cap.

<sup>\*</sup>The bottles, vials, caps, and discs listed here are those listed in EPA 40 CFR 136 (Federal Register, December 3, 1979, revised October 26, 1984) and EPA 40 CFR 141 (Federal Register, November 29, 1979).

\*\*Extracted within seven days and analyzed within 30 days.

\*\*\*If the tap water is chlorinated, 2.5 to 3.0 mg of sodium sulfite (NA<sub>2</sub>S<sub>2</sub>O<sub>3</sub>) per 40 mL of water sample is used unless maximum trihalomethane concentration is to be determined.

mined.

Table 12-2

RECOMMENDED SAMPLE STORAGE, PRESERVATION, AND HOLDING TIMES ACCORDING TO MEASUREMENT 1

Parameter	Minimum Volume Required	Container <sup>2</sup>	Preservative	Holding Time <sup>3</sup>
	(wr)			
Biological Parameters				
Fecal coliform	100	Autoclaved P,G	Cool, 4°C	6 hours
Total coliform	100	P,G	Cool, 4°C	6 hours
Fecal streptococci	100	P,G	Cool, 4°C	6 hours
Standard plate count	100	P,G	Cool, 4°C	6 hours
Benthos (macrobenthic invertebrates)		P,G	Formalin/ Glycerine	6 months
Chlorophyll- <u>a</u>	1,000	P,G	Filter on-site Freeze immediately	3 months
Phytoplankton	250	P,G	2 mL Lugol's Solution	6 months (darkness
Zooplankton	250	P,G	Formalin/ Glycerine	4 months
Physical Parameters				
Color	50	P,G	Cool, 4°C	24 hours
Conductance	100	P,G	Cool, 4°C	24 hours <sup>4</sup>
Hardness	100	P,G	Cool, 4°C HNO <sub>3</sub> to pH <2	6 months <sup>5</sup>
0dor	200	G only	Cool, 4°C	24 hours
рН	25	P,G	In situ	6 hours
Residue				
Filterable	100	P,G	Cool, 4°C	7 days
Nonfilterable	100	P,G	Cool, 4°C	7 days
Total	100	P,G	Cool, 4°C	7 days
Volatile	100	P,G	Cool, 4°C	7 days
Settleable matter	1,000	P,G	None required	2 days
Temperature	1,000	P,G	<u>In situ</u>	√o holdin
Turbidity	100	P,G	Cool, 4°C	48 hours

Table 12-2 (Cont.)

Parameter	Minimum Volume Required	Container <sup>2</sup>	Preservative	Holding Time <sup>3</sup>
	(mL)			
Inorganics, Nonmetallics	(Cont.)			
Nitrate plus nitrite	100	P,G	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH <2	24 hours <sup>6</sup>
Nitrate	100	P,G	Cool, 4°C	24 hours
Nitrite	50	P,G	Cool, 4°C	48 hours
Phosphorus, ortho-phosphate, dissolved	50	P,G	Filter on-site Cool, 4°C	24 hours
Hydrolyzable	50	P,G	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH <2	24 hours <sup>6</sup>
Total	50	P,G	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH <2	24 hours <sup>6</sup>
Total dissolved	50	P,G	Filter on-site Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH <2	24 hours <sup>6</sup>
Silica	50	Ponly	Cool, 4°C	7 days
Sul fate	50	P,G	Cool, 4°C	7 days
Sulfide	500	P,G	2 mL zinc acetate & NaOH	7 days
Sulfite	50	P,G	Determined on-site	No holding
<u>Organics</u>				
BOD	1,000	P,G	Cool, 4°C	24 hours
COD	50	P,G	H <sub>2</sub> SO <sub>4</sub> to pH <2	7 days6
Methylene blue active substance (MBAS)	250	P,G	Cool, 4°C	24 hours
Nitrilotriacetic acid (NTA)	50	P,G	Cool, 4°C	24 hours
Oil and grease	1,000	G anly	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> or HC1 to pH <2	24 hours
Organic carbon	25	P,G	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> or HCl to pH <2	24 hours
Phenolics	500	G only	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH <4 1.0 g CuSO <sub>4</sub> /l	24 hours

Paremeter	Minimum Volume Required (mL)	Container <sup>2</sup>	Preservat ive	Holding Time <sup>3</sup>
Transpire Nametallia	(Cont.)			
Inorganics, Normetallics	•			
Nitrate plus nitrite	100	P,G	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH <2	24 hours <sup>6</sup>
Nitrate	100	P,G	Cool, 4°C	24 hours
Nitrite	50	P.G	Cool, 4°C	48 hours
Phosphorus, ortho-phosphate, dissolved	50	P,G	Filter on-site Cool, 4°C	24 hours
Hydrolyzable	50	P,G	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH <2	24 hours <sup>6</sup>
Total	50	P,G	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH <2	24 hours <sup>6</sup>
Total dissolv <del>ed</del>	50	P,G	Filter on-site Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH <2	24 hours <sup>6</sup>
Silica	50	P only	Cool, 4°C	7 days
Sulfate	50	P,G	Cool, 4°C	7 days
Sulfide	500	P,G	2 mL zinc acetate & NaOH	7 days
Sulfite	50	P,G	Determined on-site	No holding
Organics				
800	1,000	P,G	Cool, 4°C	24 hours
COD	50	P,G	H <sub>2</sub> 50 <sub>4</sub> to pH <2	7 days <sup>6</sup>
Methylene blue active substance (MBAS)	250	P,G	Cool, 4°C	24 hours
Nitrilotriacetic acid (NTA)	50	P,G	Cool, 4°C	24 hours
Oil and grease	1,000	G only	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> or HCl to pH <2	24 hours
Organic carbon	25	P,G	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> or HCl to pH <2	24 hours
Phenolics	500	G only	Cool, 4°C H <sub>2</sub> SO <sub>4</sub> to pH <4 1.0 g CuSO <sub>4</sub> /l	24 hours

#### Key:

- More specific instructions for preservation and sampling are found with each procedure as detailed in E & E's methods manual. A general discussion on sampling of water and industrial wastewater may be found in American Society for Testing and Materials (ASTM), Part 31, p. 72-82 (1976) Method D-3370.
- Plastic (P) or Glass (G). For metals, polyethylene with a polypropylene cap (no liner) is preferred.
- 3. The listed holding times are recommended for properly preserved samples based on currently available data. It is recognized that extension of these times may be possible for some sample types while, for other types, the times may be too long. When shipping regulations prevent the use of the proper preservation technique or when the holding time is exceeded, as in the case of a 24-hour composite, the final reported data for these samples should indicate the specific variance. If samples cannot be analyzed within the specified time intervals, the final reported data should indicate the actual holding time.
- 4. If the sample is stabilized by cooling, it should be warmed to 25°C for reading, or a temperature correction should be made and results reported at 25°C.
- 5. When HNO $_3$  cannot be used because of shipping restrictions, the sample may initially be preserved by icing and immediately shipped to the laboratory. Upon receipt at the laboratory, the sample must be acidified to a pH <2 with HNO $_3$  (normally 3 mL 1:1 HNO $_3$ /liter is sufficient). At the time of analysis, the sample container should be thoroughly rinsed with 1:1 HNO $_3$  and the washings added to the sample (volume correction may be required).
- Data obtained from National Enforcement Investigations Center, Denver, Colorado, support a four-week holding time for this parameter in sewerage systems (Standard Industrial Code 4952).

#### 12.3 SAMPLE HANDLING AND DECONTAMINATION

E & E will identify all samples using a sample tag or other appropriate identification attached to or folded around the sample. The tag will provide the sample identification number; the date, time, and location of collection; designation of the sample as a grab or composite; notation of the type of sample and preservative; any remarks; and the signature of the sampler. E & E also will record this information in the appropriate logbook, along with any pertinent on-site measurement data and field observations.

After collection and identification, the sample will be preserved and maintained under the chain-of-custody procedures discussed below. In a similar fashion, all tags on blank or duplicate samples will be marked "Blank" or "Duplicate," respectively. Field blind duplicates will be coded and identified as such only in the field logbook.

### Chain-of-Custody Procedures

Air Force chain-of-custody requirements for this program will be clarified and incorporated in E & E's standard operating procedures. E & E will require that the possession of samples be traceable from the time the samples are collected until they are disposed of through established chain-of-custody procedures. The major elements of these E & E procedures include the following.

## Sample Custody. A sample will be considered in custody if:

- It is in the individual's actual possession; or
- It is in the individual's view, after being in his/her physical possession; or
- It was in the individual's physical possession and then he/she locked it up to prevent tampering; or
- It is in a designated secure area.

Field Custody Procedures. E & E will collect only the number needed to provide a fair representation of the media being sampled. The quantity and types of samples and sample locations will be determined prior to the actual fieldwork. As few people as possible will handle the samples. The field sampler will be personally responsible for the care and custody of the collected samples until they are transferred or properly dispatched. Sample tags will be completed for each sample using waterproof ink.

Transfer of Custody and Shipment. Samples will be accompanied by a chain-of-custody record. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record will document the transfer of custody of the samples from the sampler to another person, or to an analytical laboratory.

The samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis with a separate record prepared for each laboratory. The "Courier to Airport" space on the chain-of-custody record will be dated and signed, if necessary.

All packages will be accompanied by the chain-of-custody record showing identification of the contents. The original record will accompany the shipment and a copy will be retained by E & E.

Laboratory Custody Procedures. E & E will assure that the possession of samples is traceable from the time the samples are received. To maintain and document sample possession, E & E will follow chain-of-custody procedures. A sample custodian or a designated alternate will receive samples for the laboratory and will verify that the information on the sample tags matches that on the chain-of-custody record included with the shipment. The custodian will sign the custody record in the appropriate space. Couriers picking up samples at the airport, post office, etc., will sign in the appropriate space.

Samples forwarded to the laboratories for analysis will be retained after the analyses are completed. These samples may be disposed of only upon the orders of the program manager, and only after all tags have been removed for the permanent file.

### Sample Decontamination

All sampler containers will be considered as contaminated and subject to standard decontamination procedures prior to packaging in preparation for storage and/or shipment to laboratories for analysis. Decontamination procedures will include washing the container in a cleaning solution containing Alconox on TSP, followed by a thorough rinse with clean water. The samples will be immediately placed into a protective plastic wrap to prevent further possible contamination.

## 12.4 PROCEDURES FOR PACKING LOW CONCENTRATION SAMPLES

All samples must be packaged carefully to avoid breakage or contamination and must be shipped to the laboratory at proper temperatures. The following sample packaging requirements must be followed:

- Sample bottle lids are never to be mixed. All sample lids must stay with the original containers. Custody seals must be affixed.
- The sample volume level can be marked by placing the top of the label at the appropriate sample height, or with grease pencil. This procedure will help the laboratory to determine if any leakage occurred during shipment. The label should not cover any bottle preparation OA/OC marks.
- Unless otherwise specified, all sample bottles must be secured with a custody seal and placed in a plastic bag to minimize the potential for vermiculite contamination.
- Shipping coolers must be filled initially with approximately three inches of vermiculite or zonolite.
- The secured sample bottles must be placed in the cooler in such a way as to ensure that they do not touch one another.
- Low hazard samples (i.e., defined as environmental or less than 10 ppm of any single constituent) are to be cooled.

"Blue ice" or some other artificial icing material is preferred. If unavoidable, ice may be used provided that it is placed in 3-mil plastic bags. Ice is not to be used as a substitute for packing material.

- Any remaining space in the cooler should be filled in with inert packing material. Under no circumstances will locally obtained material (sawdust, sand, etc.) be used.
- The duplicate custody record must be placed in a plastic bag and taped to the bottom of the cooler lid.

## 12.5 PROCEDURES FOR PACKING MEDIUM CONCENTRATION SAMPLES

The procedures for packing medium concentration samples (defined as containing between 10 and 150,000 ppm of any constituent, or direct but diluted contamination, or material from previous spills, or discolored solid matrices or turbid liquids) are similar to those discussed in Section 12.4 with two notable exceptions. All medium hazard samples must first be placed in paint cans containing sufficient. vermiculite or zonolite inert materials to cushion the sample containers and absorb spills. These paint cans are sealed, properly labelled, and then placed in the cooler or other appropriate shipping container, as described in Section 13.6. Medium hazard samples are not to be cooled with ice or some other artificial icing materials.

### 13. SAMPLE CUSTODY AND DOCUMENTATION

#### 13.1 SAMPLE IDENTIFICATION DOCUMENTS

All field personnel must verify the sampling methods to be used during sample collection by making proper reference to the project plans. Prior to sampling, the field sampling personnel must ensure that all sample containers are in his physical possession or in his view at all times, or ensure that the containers are stored in a locked place at all times, so as to maintain proper custody. All sample gathering activities must be recorded in the site logbook; all sample transfers must be documented in the chain-of-custody record: all samples are to be identified with sample tags, labels, or other appropriate means of identification (hereinafter referred to as sample tags); and all sample bottles are to be sealed with custody seals. All information is to be recorded in waterproof ink. All E & E field personnel are personally responsible for sample collection and the care and custody of collected samples until the samples are transferred or properly dispatched.

# 13.2 CHAIN-OF-CUSTODY RECORDS

The custody record must be fully completed <u>in duplicate</u>, using black carbon paper where possible, by the field technician who has been designated by the project manager as being responsible for sample shipment to the appropriate laboratory for analysis. The information specified on the chain-of-custody record will contain the same level of detail found in the site logbook, with the exception that the on-site measurement data need not be recorded. The custody record

will include, among other things, the following information: name of person collecting the samples: date samples were collected; type of sampling conducted (composite/grab); location of sampling station; number and type of containers used; and signature of the E & E person relinquishing samples to a non-E & E person, such as a Federal Express agent, with the date and time of transfer noted. In addition, if samples are known to require rapid turnaround in the laboratory because of project time constraints or analytical concerns (e.g., extraction time or sample retention period limitations, etc.), the person completing the chain-of-custody record should note these constraints in the remarks section of the custody record.

If it is is not practicable to seal all containers at a Federal Express office, they should be sealed beforehand. The <u>duplicate</u> custody record will therefore have the signature of the relinquishing field technician and a statement of intent such as "To Federal Express (Baltimore office) p.m. 6/31/84." The duplicate custody record is then placed in a plastic bag, taped to the underside of the box lid, and the box closed. The container is to be tightly bound with filament tape, and if required, at the discretion of the project manager, may be padlocked. Finally, at least two custody seals are to be signed by the individual relinquishing custody and affixed in such a way that the box cannot be opened without breaking them.

At the shipping agent's office, the relinquishing individual will put all the specific shipping data (airway bill number, office, time, and date) on the <u>original</u> custody record which is to be transmitted to the project manager (by mail or by hand as appropriate). The original and duplicate custody records and the airway bill or delivery note together constitute a complete record and it is the project manager's responsibility to ensure that all are consistent and they are made part of the permanent job file maintained at the ASC.

At the laboratory, the sample custodian will open the package, retrieve the duplicate record, and complete the "Received for Laboratory by" box by affixing his signature. The custodian also is to fill in the "Method of Shipment" box with the shipper's name (e.g., Federal Express) and airway bill number.

#### 13.3 FIELD LOG BOOKS

Site logbook(s) must be maintained for each project. All site logbooks must be bound, contain numbered pages, and be waterproof. The following documentation is to be recorded in the site logbooks: sampling locations, station numbers, dates, times, sampler's name, designation of the sample as a grab or composite, notation of the type of sample (e.g., groundwater, soil boring, etc.), preservatives used, on-site measurement data, and other field observations and remarks. Each series of site logbook entries for a particular sampling effort must be initialed by the person recording the information and, where appropriate, summary entries that organize and/or clarify data presented in the logbook are to be prepared by the person recording the information. After reviewing the entries, the field team leader must sign each page of the site logbook on the top and the bottom.

As with all data logbooks, no pages will be removed for any reason. If corrections are necessary, these must be made by drawing a single line through the original entry (in such a manner that the original entry can still be read) and writing the corrected entry alongside. The correction must be initialed and dated. Most corrected errors will require a footnote explaining the correction.

The site logbook is the prime repository of information of actual site conditions and as such is an important link in the analytical chain. Any details which may be relevant to the analysis or integrity of samples must be recorded. Preliminary sample descriptions are helpful. Any unusual circumstances should be noted, e.g., heavy rain or difficulty in pH meter calibration. At the completion of the sampling exercise, the logbook must be retained by and/or returned to the project manager and is to be made part of the permanent project file. To the extent that any information contained in the logbook is relevant to sample analysis to be performed, such data are to be made available to the laboratory performing said analyses by the project manager.

#### 13.4 CORRECTIONS TO DOCUMENTATION

As with data logbooks, if corrections to any site documentation are necessary, these must be made by drawing a single line through the original entry (in such a manner that the original entry can still be

read) and writing the corrected entry alongside. The correction must be initialed and dated. Most corrected errors will require a footnote explaining the correction.

When completing any of the laboratory logs, all crossouts and/or changes in logbook entries must be made with a single line and initialed by the same custodian who is responsible for the original entry; corrections also may be supplemented by a footnoted explanation, so long as the footnote is initialed by the same custodian responsible for the original entry. This general rule may be relaxed only if the ASC director or manager authorizes such a deviation from the rule and initials the change together with the other custogian making the correction.

### 13.5 TRAFFIC REPORTS, SAMPLE LABELS, AND CUSTODY SEALS

### Traffic Reports

The documentation system provides the means to individually identify, track, and monitor each sample from the point of collection through final data reporting based on the use of sample traffic reports, each printed with a unique sample identification number. One traffic report and identification number is assigned by the sampler to each sample taken. Then, regardless of where a sample was collected or analyzed, the sample can always be identified and tracked by use of the assigned number. Traffic reports are used in conjunction with chain-of-custody and other document requirements.

To provide a permanent record for each sample collected, the sampler completes the traffic report in triplicate at the time the sample is taken. Data required include the project identification number, site location and number, dates and times when samples were taken, shipping information, name of laboratory preforming analysis, and estimated and sample concentration. The top copy becomes the sampler's file copy. The bottom two copies are sent with the samples to the designated laboratory. Upon receipt of the samples, the laboratory completes the required information concerning sample conditions and documentation. The laboratory then returns one copy to the project manager and retains a copy for their files.

#### Sample Tags

E& E field personnel will properly identify all samples taken in the field by using a sample tag attached to or affixed around the sample container. The sample tag must contain the field identification number; the date, time, and location of sample collection; designation of the sample as a grab or composite; notation of the type of sample (e.g., groundwater, soil boring, etc.); identification of preservatives used; any remarks; and the signature of the sampler. The sample tags are to be placed on the bottles so as not to obscure any OA/QC data on the bottles. Sample information must be printed in a legible manner using waterproof ink. Field identification must be sufficient to enable cross-reference with the site logbook.

## Custody Seals

Custody seals are preprinted adhesive-backed seals with security slots designed to break if they are disturbed. Individual sample bottles are sealed over the cap by the sampling technician. Sample shipping containers (coolers, cardboard boxes, etc., as appropriate) are sealed in as many places as necessary to ensure security. Seals are signed and dated before use. On receipt at the laboratory, the custodian will check (and certify, by completing logbook entries) that seals on boxes and bottles are intact.

#### 13.6 SHIPPING OF SAMPLES

Environmental and hazardous samples will be properly packaged and labelled for shipment and dispatched to the appropriate laboratory for analysis. A separate chain-of-custody record must be prepared for each laboratory. The following requirements for shipping containers must be followed:

- United States Department of Transportation (DOT) regulations covering the transport of hazardous materials are contained in 49 CFR Parts 170-179.
- Shipping containers must be padlocked or custody-sealed for shipment, as appropriate. The package custody seal is to consist of filament tape wrapped around the package at least

twice and a custody seal iffixed at appropriate access points. In this way, access to the package can be gained only by cutting the filament tape and breaking the seal.

- All of the shipping coolers/package containers must be secured by field personnel with a proper custody seal, marked with indelible pen or ink, and addressed to Ecology and Environment, Inc., Analytical Services Center, 4285 Genesee Street, Buffalo, NY 14225, or another laboratory as appropriate.
- Field personnel must make arrangements for transportation of samples to the ASC. When custody is relinquished to a shipper, E & E field personnel must telephone the ASC custodian (716/631-0360) to inform him of the expected time of arrival of the sample shipment and to advise him of any existing time constraints on sample analysis.

#### 14. SITE CLEAN-UP

The objective of site clean-up is to leave the areas of investigation essentially as they were found, except of course for the physical addition of monitoring wells and guard posts. Site clean-up also includes close coordination with base personnel to insure that clean-up operations are in accordance with overall management of base operations.

E & E has responsibility for assuring the safe and proper conduct of subcontractors in this work and the associated equipment. Decontamination procedures will be conducted to insure that potential contamination remains on-site. General cleanup of equipment and vehicles will be conducted consistent with accepted Reese AFB practices and in close coordination with the Bioenvironmental Engineer (BEE).

Drill cuttings and investigation-derived wastes (e.g., expendables such as Tyvek over-suits) become the property of Reese AFB. These materials will be labeled and staged in the secure area (with assistance from the BEE) pending the results of analyses that will determine whether these wastes can be generally disposed or must be disposed as contaminated or hazardous waste.

### 15. FIELD TEAM ORGANIZATION AND RESPONSIBILITIES

Once the strategy and objectives of the work plan have been developed, a team must be organized to implement the plan. The specific techniques described in the work plan are likely to include: environmental sampling, sampling of hazardous substances, drilling operations, mapping, hazardous substance inventory, etc.

Hazardous substance sites present many hazards, physical conditions, and situations that require a wide variety of expertise and scientific support to insure safe entry and data collection. It is impractical to design a standard site entry team given the significant differences among sites. Therefore, each site requires a team tailored to the potential hazards and objectives of each specific site. The field investigation team will likely consist of individuals with various technical backgrounds, i.e., chemist, engineer, hydrogeologist, who will also fill field positions such as site safety officer or command post supervisor.

A team entering a hazardous substance site is organized for mutual support and safety. Hazardous site investigations require a complete respect for safety by all team members to prevent injury or loss of life.

## 15.1 ORGANIZATION AND RESPONSIBILITIES

There are eight roles which may be required for a field investigation team. These roles are dictated by the potential site hazards. Dual role assignments are not encouraged but may be acceptable when

hazardous substances and physical conditions at a site are well documented.

The following addresses the duties and responsibilities of the eight roles:

- Project team leader;
- Field team leader;
- Site safety officer;
- Personnel decontamination station (PDS) operator/equipment specialist;
- Command post supervisor;
- Initial entry party;
- Work party; and
- Emergency response team.

#### Project Team Leader

The project team leader is primarily an administrator when not participating in the field investigation as field team leader or command post supervisor. The project team leader is responsible for:

- All the team does or fails to do. Some of this responsibility may be passed on to the field team leader and site safety officer;
- Preparation and organization of all project work;
- Selection of team personnel and briefing them on specific assignments;
- Obtaining permission to enter the site from the owner;

- Coordinating with the feelulthan leaver to complete the work plan;
- Completing final reports and preparation of the evidentiary file; and
- Insuring that safety and equipment requirements are complete.

### Field Team Leader

The field team leader is responsible for the overall operation and safety of the field team. As mentioned, this role can be filled by the project team leader or his designated representative. The field team leader may join the work party. He is responsible for:

- Safety and safety procedure enforcement;
- Field operations management;
- Public relations/state and federal liaison;
- Site control:
- Compliance of field documentation and sampling methods with evidence collection procedures;
- Execution of the site work plan; and
- Determination of the level of personal protection required (in conjunction with the site safety officer).

## Site Safety Officer

The site safety officer has primary responsibility for all safety procedures and operations on-site. Ideally, the site safety officer will report to the person responsible for safety in the organization rather than to the field team leader or project team leader. This allows two separate lines of authority. It also allows decisions based on safety to be represented on an equal basis with decisions

based on the pressures for accomplishing the investigation according to schedule.

The site safety officer remains half-dressed in the appropriate level of protective equipment to respond to emergencies. He stays on the clean side of the exclusion area while monitoring the work party and site activities. The site safety officer is also responsible for:

- Updating equipment or procedures based on new information gathered during the site inspection;
- Upgrading the levels of protection based on site observations;
- Enforcing the "buddy system";

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- Determining and posting locations and routes to medical facilities, including poison control centers; arranging for emergency transportation to medical facilities;
- Notifying local public emergency officers, i.e., police and fire department, of the nature of the team's operations, and posting their telephone numbers;
- Controlling entry (if possible) of unauthorized persons to the site;
- Entering the exclusion area in emergencies when at least one other member of the field team is available to stay behind and notify emergency services, or after he has notified emergency services;
- Examining work party members for symptoms of exposure or stress;
- Determining the suitability of a team member for work in the exclusion area, based on the team member's physical profile determined by the health and safety program and the team member's current physical condition; and

o Providing emergency medical care and first aid as necessary on-site. The site safety officer has the ultimate responsibility to stop any operation that threatens the health or safety of the team or surrounding populace.

## PDS Operator/Equipment Specialist

The PDS operator/equipment specialist functions in two roles that do not require concurrent attention. As the equipment specialist, he is charged with:

- Insuring that all equipment is poperly maintained and operating;
- Inspecting all equipment before and after use;
- Insuring that all required equipment is available: and
- Decontaminating all personnel, samples, and equipment returning from the exclusion area.

The PDS operator/equipment specialist is responsible for design and setup of the PDS and for preparing the necessary decontamination solutions to insure that chemical contamination is not transported into the clean area by inspection equipment, samples, protective clothing, or personnel. Failure to properly execute these duties reduces the effectiveness of the protective equipment and threatens the rest of the field team. The PDS operator/equipment specialist also manages the mechanics of removing contaminated clothing from the work party and the proper disposal of discarded contaminated clothing and decontamination solutions.

#### Command Post Supervisor

The command post supervisor functions as the clearinghouse for communications. He does not enter the exclusion area to assist the work party except for certain emergency situations. Should an emergency arise, the command post supervisor notifies emergency support personnel by phone, radio, etc., to respond to the situation.

Depending on the team size and the nature of the emergency, the command post supervisor may in extreme situations assist the site safety officer in effecting a rescue. Usually, the command post supervisor may be called upon to assist the PDS operator/equipment specialist in operating the PDS during an emergency, and assist the site safety officer in emergency medical measures. The field team leader may assume the position of command post supervisor.

The command post supervisor is also responsible for:

- Maintaining a log of communications and site activities such as duration of work periods with respirators;
- Sustaining communication and line-of-sight contact with the work party;
- Maintaining public relations in the absence of the field team leader; and
- Assisting the site safety officer and PDS operator/equipment specialist as required.

## Initial Entry Party

he initial entry party enters the site first, employing special-instrumentation to characterize site hazards. Usually the field team leader should be a part of the initial entry party to familiarize himself with conditions and dangers associated with the site. The major purpose of this team is to measure existing hazards and survey the site to ascertain if the level of personal protection determined from preliminary assessment and site inspection must be adjusted.

The initial entry party can consist of as few as two people if a wheelbarrow or other device is used to transport all the instrumentation. Three or four people are able to do the job more efficiently.

## Work Party

The work party performs the on-site tasks necessary to fulfill the objectives of the investigation, e.g., obtaining samples or determining locations for monitoring wells. No team member should enter or

exit the exclusion area alone. The work party consists of a minimum of two individuals, and any work party should follow this buddy system. Besides the safety considerations, it is much easier for two persons dressed in protective clothing to perform such tasks as note-taking, photographing, and sampling.

## Emergency Response Team

Extensive assignments requiring long hours and large work parties (more than five) necessitate the use of a standby emergency response team. The emergency response team is half-dressed in protective gear so that it can quickly enter the exclusion area in the event of an emergency. This team is particularly valuable at dangerous sites where protective equipment produces stress and heat loads on the work party.

#### 15.2 TEAM SIZE

The size of a team employed in an investigation is determined by two sometimes contradictory requirements: the need for a team large enough to maximize safety versus the desire for economy. Team size is dependent upon site organization, levels of protection, work objectives, and site hazards. Additional team members can always be added according to the roles required.

### Two-Person Team

The two-person team is the minimum for a hazardous substance site investigation, but is very limited. Such a team should never enter an inactive hazardous substance site. The two-person team is best suited for off-site surveys and inspections or obtaining environmental (non-hazardous, off-site) samples. Ground truthing of aerial photographic surveys, inspection of files, or interviews can all be accomplished by the two-person team.

#### Three-Person Team

The three-person team can be employed on sites requiring Level C protection and, in some cases, on sites requiring Level B protection. This team is composed of field team leader; an individual fulfilling the combined functions of PDS operator/equipment specialist, site

safety officer, and command post supervisor; and another individual to enter the site with the field team leaser.

The three-person team is used where extensive PDS procedures are not required and where the likelihood of emergency rescue is low. This field investigation team is best utilized in non-IDLH (immediately dangerous to life and health) atmospheres where the primary objective is to map, photograph, or inventory. Its use assumes that at no time will the work party be exposed to hazardous situations.

Considerable care and thought are necessary before a three-person team is employed on a site because each individual has numerous responsibilities. In the event of an accident, the third member does not enter the site to offer emergency assistance until he has summoned outside assistance, and even then, only when he feels rescue will not endanger his own life.

# Four-Person Team

Most Level B operations can be conducted with a four-person team. These operations would include work on active sites where facility personnel are present or on inactive sites with potentially IDLH atmospheres. The objectives of a four-person team at a site requiring Level B protection might include sampling of ponds, soils, or open containers and inspections at sites known for poor housekeeping, i.e., spills, leaks, etc.

The team consists of the standard two-person work party, a combination site safety officer and PDS operator/equipment specialist, and a command post supervisor who may assist in the PDS operation.

Because life-threatening hazards are assumed or known to be present at a Level B site, it is essential that all personnel be fully acquainted with their duties. During an emergency, the command post supervisor stays in the support area to maintain communication while the site safety officer/PDS operator/equipment specialist enters the exclusion area to aid the work party. Once the work party is in the contamination reduction area, the command post supervisor can then offer assistance on the PDS or provide fresh equipment from the support area.

#### Five-Person Team

The five-person team is the minimum size for most Level B operations or when known percutaneous hazards exist or there is an absence

of historical information. The site hazards that require Level first tection, combined with the limitations and stresses placed or section, generally necessitate a fill-time PDS operator/equipment specialist who can also serve in emergency response. In the event of a serious emergency such as a fire, expiration, or acutely toxic release, both the site safety officer and parapperator/equipment specialist may need to enter the exclusion area dressed in Level B gear. The command post supervisor remains in the support area to direct outside help to the site and then assume the functions of PDS operator/equipment specialist.

### Teams of Seven or More

Certain hazardous substance sites requiring sampling operations necessitate larger or alternating work parties and additional support personnel in the contamination reduction area. The seven-person team employs the basic five-person structure plus an additional work party for alternating work loads. The eight-person team includes an additional PDS operator/equipment specialist to assist in the continuous decontamination tasks involved with alternating work parties, and to decontaminate and pack samples as they are received.

It is not unusual to employ larger teams where such tasks as drum opening may require three work parties downrange working concurrently or may require a team to work under rigorous safety procedures. Larger teams can be designed with additional work parties and support personnel to safely gather the site data and insure communication and site control.

### 15.3 TRAINING

Although trained and experienced personnel are assigned, training is essential to successful project completion.

### Mobilization Meeting

Before mobilization begins, a team training meeting is held to discuss assignments and the needs of the work, including equipment and health and safety requirements.

## On-Site Start-Up Meeting

During site start-up, a team training meeting and site tour are conducted to review the health and safety plan, particular protocols for the project, and the project objectives. In keeping with E & E corporate health and safety policies, every site worker must complete this orientation regardless of when they begin initial site work on the project. Records are maintained of this meeting and the topics covered.

# Daily Briefings and De-Briefings

Each morning a short briefing is held for all team members to outline the objectives for the day and allow health and safety monitoring. Instrument calibration checks usually occur during this time also. On sites with high potential for chemical exposure, a site survey tour would be made with monitoring instruments before fieldwork is allowed to begin. Based on current knowledge, this daily survey team is not needed for the work at Reese AFB.

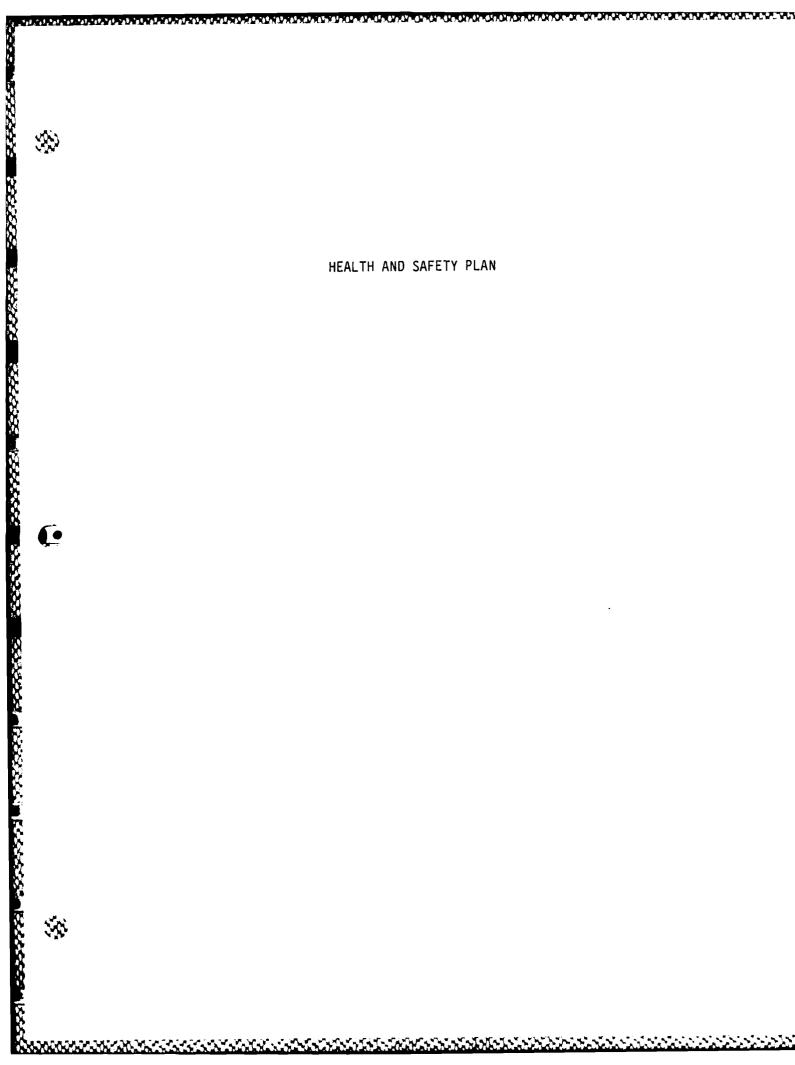
At the end of each work day, a short de-briefing meeting is held to review accomplishment vs. objectives and to identify objectives for the next day's work. Data evaluation, planning, and sample management and shipping often follow this meeting.

### 16. SCHEDULE

The schedule for the investigation of the various sites in the Reese AFB Phase II Confirmation Study cannot be formulated in a realistic format until a final determination concerning sites and activities is made. At that time, schedule development will take into consideration the scheduling of concurrent site activities.

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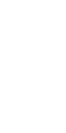
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#### MEMCHANDUM

TO: R. Marszalkowski-EEEUF

FROM: M. Benner-EEDAL

DATE: 8 August 1986

SUBJECT: Site Safety Plan Change-Reese AFB IRP

(DF - 2000)

CC: P. Jonmaire

This memorandum outlines the safety plan changes as per the telephone conversation of 6 August between Benner, Marszalkowski, and Jonmaire.

Original consideration was for the lake bottom sediment samples at the industrial and sewage lakes to be collected using a boat. This procedure was in the safety plan. However, after close inspection of the lakes and discussion regarding the intent of the samples, it is proposed that the boats not be used. Samples will be collected by wading into the lake and using a Wildco Core Sampler to retrieve the sample.

Safety gear will include chest waders, Syranex suits, and Neoprene gloves. The sampler(s) will be attached to safety lines which will be manned on shore. Distance from shore will be only far enough to reach thigh deep water or 50 feet from shore.

Rationale for this change in the safety plan is that the lake bottoms are adequate for support. Stability working from the stern of a row boat is of concern. Discussion with P. Jonmaire indicated his agreement to the change. Sampling is scheduled for 7 August.

## ecology and environment, inc.

# HAZARDOUS AND TOXIC MATERIALS TEAM SITE SAFETY PLAN

#### A. CENERAL INFORMATION

V. SCHEDAY THE ORDER TON	
SITE: Reese Air Force Base Job No.: DF-2000	
ocation: Lubbock, TX	
PLAN PREPARED BY: P. Brodzik DATE: 6-11-	86
APPROVED BY: Michael A. Forston /4 DATE: Ca-	20-jc
DBJECTIVE(s): Installation and sampling of both new and existing mon	itoring
wells. Surface and subsurface soil sampling, Geophysics	
PROPOSED DATE OF INVESTIGATION: Start 6-23-86 Complete 8/30/86	
BACKGROUND REVIEW: Complete: X Preliminary:	
DOCUMENTATION/SUMMARY: Overall Hazard: Serious: Moderate: X  Low: X Unknown: X	
B. SITE/WASTE CHARACTERISTICS	
Corrosive X Ignitable X Radioactive Volatile  Toxic X Reactive X Unknown X Other (Name) Suspect Carcinogen  FACILITY DESCRIPTION: An Air Force Pilot Training Center housing the Flying Training Wing (ATC)  Principal Disposal Method (type and location): Varied: Landfills, Lagoon	64th
Disposal Pits	
Unusual Features (dike integrity, power lines, terrain, etc.): Multiple locat of contamination	ions
Status: (active, inactive, unknown) Active	
History: (injuries; complaints; previous agency action): See Attachment A: History	
	— <del></del> -
	<del></del>
7/84 Revis	ea DLD

# C. HAZARD EVALUATION (Use Supplemental Sheets of Necessary)

Summary (attach copy of available chemical information from Saxs, Merck, Index, Ohmtads, etc.): Heat Stress (see Attachment B)
Heavy Metals - Pb, Cr, Cd
Chromates
Hydrocarbons - MEK, MIBK, Toluene, Acetone, Volatiles, Benzene
Pesticides
Asbestos from Demolition Waste
Fuels & Oils
Polynuclear Aromatics
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Toxaphene - TLV is 0.5 mg/m <sup>3</sup> -absorbed through the skin, gastroenteric
tract, or through the lungs.
Carbon Tetra Chloride - TLV is 5 ppm - routes of entry are skin, eyes,
and inhalation or ingestion. A probable relationship of alcohol
consumption toward predisposition of the individual toward the toxic
effects of carbon tetrachloride.
D. SITE SAFETY WORK PLAN
annual control television and television VAS
PERIMETER ESTABLISHMENT: Map/Sketch Attached? <u>Yes</u> Site Secured? <u>Yes</u>
Perimeter Identified? <u>Yes</u> Zone(s) of Contamination Identified? <u>Yes</u>
PERSONAL PROTECTION:
Level of Protection: A B C X D X
Modifications: Hearing protection around drill rigs and during heavy
aircraft activities, gloves and booties will be taped to Tyvek
coveralls. A hard hat must be worn when working at or near the drill
rig, 'Hooded saranex coveralls will be worn by all personnel in the Jon-Bo
rig, 'Hooded saranex coveralls will be worn by all personnel in the Jon-Bo during water and sediment sampling. Surveillance Equipment and Materials: HNU, OVA, Explosimeter, Oz-meter
tape)mini-rad
Explosimeter-between 20% and 50% LEL continue inspection but monitor
carefully. At greater than 50% LEL evacuate site immediately. At
less than 19.5% and greater than 25% oxygen, evacuate site. Any
depressions in the earth will be cleared with the explosimeter,
0, meter prior to entry.
7/84 Revised DLD

SPECIAL SITE CONSIDERATIONS: See Insert	z SS
DECONTAMINATION PROCEDURES:	
	sh/Methanol Rinse (substitute another ible, or acetone and hexane). Methanol Deionized water rinse.*
Equipment: <u>Same as above with s</u> wrapped and dry deconned. (Se	steam cleaning electrical equipment ee Attachment C)
site, written authorization is to be received initiation of on site activities): Materials hazardous waste. If hazardous	(Note - If material is proposed to be left on wed by the Project Team Leader prior to the ial to be tested to determine if it s, disposal is the responsibility of material will be disposed of on-site.*
SITE ENTRY PROCEDURES: Command Post ar Both will be moved if wind shifts	nd PDS upwind of contaminated area. s. Buddy system in effect.
Team Member	Responsibility
Mike Benner	Project Manager
Paul Brodzik	Assistant Project Manager
Don Smith	Chemist
Bill Park	Site Safety Officer
Subcontractors:	Field Supervisor
Roy Burson	Field Supervisor
Bill Long	Supervisor General Manager
Dala Bowlin	
Bob Masten	Driller
Rick Reed	Helper

7/84 Revised DLD

Hel er

Carl Richter

<sup>\*</sup> If methanol is used, ambient air will be monitored with an OVA. APRs with combination cartridges cannot be worn.

<sup>\*\*</sup> Containment and drumming of spoils and decon fluids.

### INSERT SS

Heat stress will be monitored and recorded. All subcontractor personnel will be medically approved and trained in the use of respiratory and protective equipment. All drilling locations will be subjected to geophysical surveys to locate underground hazards prior to work. Alternate work schudules (early morning, late afternoon & evening) may be necessary to avoid the hottest part of the day.

Water and sediment samples to be taken from the Industrial Waste Lake and the Sewage Lake will be taken from a jon-boat. The Wildco Core Sampler will be used to collect sediment samples. Bottles attached to string will be used to collect water samples.

Personnel will exercise caution if working near active aircraft runway.

All Personnel in the boat will wear life vests and will be tethered to the boat. Also, safety lines will be attached to the samplers and will be held by personnel on shore. A rescue boat will be located on shore for used in an emergency.

### E. EMERGENCY INFORMATION

(Use Supplemental Sheets of Necessary)

## EMERGENCY PRECAUTIONS

Acute Exposure Symptoms	First Aid		
Hydrocarbon vapors	Fresh air, rest Rest, shade, fluids, cool body		
Heat Stroke, anoxia			
	Monitor heart rate and temperatur		
-			
LOCAL RE (Name, Address a			
(Name, Aut 233 a	io mone number/		
Ambulance On air force base medical 1	facilities		
Hospital Emergency Room Lubbock General	Hospital, 602 Indiana (806) 743-9911		
Poison Control Center 793-4366			
Police (incl. Local, County Sheriff, State)	_ubbock County Sheriff 741-8091		
Fire Department Lubbock County Fire De			
Airport			
Explosives Unit			
Agency Contact (EPA, State, Local, USCG, etc.)	)		
Local Laboratory			
UPS/Federal Express			
Client Contact USAF: Sgt. Maj. John Tic	ce (806) 885-3327		
SITE RE	SOURCES		
Telephone On-site			
Radio <u>On-site</u>			
Other Two way radios			
	7/84 Revised DLD		

#### Emergency Contacts

- 1. Mr. Raymond Harbison (University of Arkansas) ....... (501) 661-5766 or 661-5767 (501) 370-8263 (24 hour)
- 2. Ecology and Environment, Inc., Safety Coordinator/

  \$2. Ecology and Environment, Inc., Safety Coordinator/

  \$2. Ecology and Environment, Inc., Safety Coordinator/

  (716) 632-4491 (office)

  P. Jonmaire (716) 655-1260 (home)

#### Medtox Hotline

- 1. Twenty-four hour answering service (501) 370-8263 What to Report:
  - o State: "This is an emergency."
  - o Your name, region, and site.
  - a Telephone number to reach you.
  - o Your location.
  - o Name of person injured or exposed.
  - o Nature of emergency.
  - o Action taken.
- One of three toxicologists (Drs. Raymond Harbison, Richard Freeman, or Robert James) will contact you. Repeat the information given to the answering service.
- If a toxicologist does not return your call within 15 minutes, call the following persons in order until contact is made:
  - E & E Corporate Headquarters (EST 0830-1700) (716) 632-4491
  - a. Twenty-four hour line (716) 631-9530
  - b. Corporate Safety Director David Dahlstrom (home (716) 741-2384)
  - c. Assistant Corporate Safety Officer Steve Sherman (home (716) 688-0084)

#### Emergency Routes

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## F. EQUIPMENT CHECKLIST

	PROTECTIVE GEAR			
	LEVEL A		LEVEL B	
	SCBA		SCBA	
	SPARE AIR TANKS		SPARE AIR TANKS	
	ENCAPSULATED SUIT		CHEMICAL RESISTANT COVERALLS	
	SURGICAL GLOVES		PROTECTIVE COVERALL (TYPE)	
	NEOPRENE SAFETY BOOTS		RAIN SUIT	•
	BOOTIES		BUTYL APRON	•
	GLOVES (TYPE)		SURGICAL GLOVES	•
	OUTER WORK GLOVES		GLOVES (TYPE )	•
	HARD HAT		OUTER WORK GLOVES	•
	CASCADE SYSTEM		NEOPRENE SAFETY BOOTS	•
			BOOTIES	
			HARD HAT WITH FACE SHIELD	
			CASCADE SYSTEM	•
			MANIFOLD SYSTEM	•
				•
	LEVEL C		LEYEL D MSA	
MSA	ULTR-TWIN RESPIRATOR	<u> </u>	ULTRA-TWIN RESPIRATOR (AVAILABLE) X	-
	POWER AIR PURIFYING RESPIRATOR		CARTRIDGES (TYPEGMC-H,GMP ) X	_
	CARTRIDGES (TYPE GMC-H, GMP)	<u> </u>	ROBERTSHAW ESCAPE MASK (AVAILABLE)	_
	ROBERTSHAW ESCAPE MASK		CHEMICAL RESISTANT COVERALLS	-
	CHEMICAL RESISTANT COVERALLS		PROTECTIVE COVERALL (TYPETyvek/Saranex ) X	_
	PROTECTIVE COVERALL (TYPE Tyvek/Saranex)	<u> </u>	RAIN SUIT	_
	RAIN SUIT		NEOPRENE SAFETY BOOTS X	_
	BUTYL APRON		BOOTIES X	_
	SURGICAL GLOVES	<u> </u>	work GLOVES Butyl, Nitrile X	-
	GLOVES (TYPE Butyl, Nitrile	X_	HARD HAT WITH FACE SHIELD X	_
	OUTER WORK GLOVES		SAFETY GLASSES	_
	NEOPRENE SAFETY BOOTS	<u> X</u>	SAFETY GLASSES  Latex Gloves X	_
	HARD HAT WITH FACE SHIELD	X_	Hearing Protection X	
	Booties	Х	7/87. 82	5
			7/84 Revised DLi	J

INSTRUMENTATION		DECON EQUIPMENT (CONT.)	
DVA	<u> </u>	PLASTIC SHEETING	<u> </u>
THERMAL DESORBER	_	TARPS	
02/EXPLOSIMETER	<u> </u>	TRASH BAGS	X
EXPLOSIMETER CALIBRATION KIT	X	TRASH CANS	<u> </u>
HNU	<u> X</u>	MASKING TAPE	<u> </u>
VICTOREEN 471		DUCT TAPE	X
MAGNETOMETER	_X_	PAPER TOWELS	<u> X</u>
PIPE LOCATOR		FACE MASK	X
WEATHER STATION		FACE MASK SANITIZER	_X_
DRAEGER PUMP	<u> </u>	FOLDING CHAIRS	X
BRUNTON COMPASS		STEP LADDERS	
EM-51	<u> </u>		
FIRST AID EQUIPMENT		SAMPLING EQUIPMENT	
FIRST AID KIT	<u> X</u>	Augers	$\frac{\chi}{\chi}$
OXYGEN ADMINISTRATOR		Split Spoons	
STRECHER		Wildco Core Sampler	X
PORTABLE EYE WASH		Drager Tubes-Methylene Chlo	ori <u>ce</u> X
BLOOD PRESSURE MONITOR	<u> </u>		
RADIATION BADGES	<u>_x</u>		
FIRE EXTINGUISHER	<u>_X</u>		
			_
DECON EQUIPMENT			
WASH TUBS	<u> </u>		
BUCKETS	<u></u>		
SCRUB BRUSHES	<u>X</u>		
PRESSURIZED SPRAYER			
DETERGENT (TYPE Commercial)	<u> </u>		
SOLVENT (TYPE Methanol )	X		
HTH, Sodium Bicarbonate P	ower X		

7/84 Revised DLD

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AN EQUIPMENT		MISCELLANEOUS (CONT.)	
TOOL KIT	X	BINOCULARS	
HYDRAULIC JACK		MEGAPHONE	
LUG WRENCH		Camera	<u> </u>
TOW CHAIN		2-way radios	X
AN CHECK OUT		Jon-Boat	X
GAS		Life Vests	Х
OIL			Χ
ANTIFREE7E			<u>X</u>
BATTERY	· —		
WINDSHIELD WASH			
TIRE PRESSURE			
	_		
41SCELLANEOUS			
PITCHER PUMP			
SURVEYOR'S TAPE			
	<u> X</u>		
	<u>_X</u>		
NYLON STRING			_
SURVEYING FLAGS	<u> X</u>		
FILM	<u>X</u>		
WHEEL BARROW		•	
BUNG WRENCH			
SOIL AUGER	X_		
PICK	<u>x</u>		
SHOVEL	<u>X</u>		
CATALYTIC HEATER			—
PROPANE GAS			
BANNER TAPE			
SURVEYING METER STICK			
CHAINING PINS & RING			
TABLES	<u> X</u>		
WEATHER RADIO			

## ecology and environment, inc.

## HAZARD EVALUATION OF CHEMICALS

hemical Name Methy	Fithyl Ketone
·	
AS Number	<del></del>
-formana Compulhad	(at an la ) a
eferences Consulted	
-	de Verschueren Merck Index Hazardline (Chris (Vol. II)
oxic and Hazardous 5	afety Manual ACGIH Other:
M	/e 2 Butanono Ethyl Mothyl Kotono
	(Synonyms: 2-Butanone, Ethyl Methyl Ketone
memical tormina Cu3	Molecular Weight 72.11
mysical state Fidul	d Solubility (H <sub>2</sub> 0) Boiling Point 79.6 Degrees
	Vapor Pressure/Density 71.2 mm Freezing Point-86.3 Degree
	6 0 20° COdor/Odor Threshold 10 ppm Flammeble Limits 1.8%-11.59
Incompetabilities	
Biological Properties	5, 3
1LV-TWA 200 ppm-590	mg/m PEL Odor CharacteristicLike acetone
IDLH	Human Aquatic5640 mg/L/48h Res/Mouse LD 3400
Route of Exposure Inh	nalation, ingestion, direct contact
arcinogen	Teratogen Mutagen
	ons: (Personal protective measures)
Impermeable cloth	nes, gloves, boots; eye protection (face shields);
Impermeable cloth	
Impermeable cloth respirators with	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.
Impermeable cloth	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.
Impermeable cloth respirators with	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.
Impermeable cloth respirators with	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.
Impermeable cloth respirators with	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.
Impermeable cloth respirators with	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.
Impermeable cloth respirators with	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.
Impermeable cloth respirators with	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.
Impermeable cloth respirators with Monitoring Recommenda Disposal/Waste Treatm	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.  ations:
Impermeable cloth respirators with Monitoring Recommenda Disposal/Waste Treatm Health Hazards and Fi	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.  ations:  irst Aid:
Impermeable cloth respirators with Monitoring Recommenda Disposal/Waste Treatm Health Hazards and Fi	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.  ations:  irst Aid: ve to fresh air, perform artificial respiration if needed
Impermeable cloth respirators with Monitoring Recommenda  Disposal/Waste Treatm  Health Hazards and File	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.  ations:  irst Aid:
Impermeable cloth respirators with Monitoring Recommenda  Disposal/Waste Treatm  Health Hazards and Fi Inhalation: remove Eyes: wash with particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and par	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.  ations:  irst Aid: ve to fresh air, perform artificial respiration if needed plenty of water for at least 15 min.
Impermeable cloth respirators with Monitoring Recommenda  Disposal/Waste Treatm  Health Hazards and Fi Inhalation: remove Eyes: wash with particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and par	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.  ations:  irst Aid: ve to fresh air, perform artificial respiration if needed plenty of water for at least 15 min.  Irritating to eyes, nose, throat; nausea; vomiting;
Impermeable cloth respirators with Monitoring Recommenda  Disposal/Waste Treatm  Health Hazards and Fi Inhalation: remove Eyes: wash with particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and particular and par	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.  ations:  irst Aid: ve to fresh air, perform artificial respiration if needed plenty of water for at least 15 min.
Impermeable cloth respirators with tonitoring Recommenda Disposal/Waste Treatment of the Inhalation: remove Eyes: wash with process of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalation of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic of the Inhalatic o	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.  ations:  irst Aid: ve to fresh air, perform artificial respiration if needed plenty of water for at least 15 min.  Irritating to eyes, nose, throat; nausea; vomiting;
Impermeable cloth respirators with respirators with donitoring Recommenda Disposal/Waste Treatment of the Inhalation: remove Eyes: wash with particular and Figure 1.	nes, gloves, boots; eye protection (face shields); organic vapor cartridges at 10 ppm; SCBA at 200 ppm.  ations:  irst Aid: ve to fresh air, perform artificial respiration if needed plenty of water for at least 15 min.  Irritating to eyes, nose, throat; nausea; vomiting;

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Chemical Name Methyl	Isobutyl Ketone Date
DOT Name/U.N. No.	
CAS Number	
References Consulted (	rirele):
NIOSH/OSHA Pocket Guide	Verschueren Merck Index Hazardline (Chris (Vol. II)
	Tety Manual ACGIH Other:
	Hexone, Isopropylacetone,
Chemical Properties:	(Synonyma: 4-methyl-2-pentanone, MIBK, Isobutyl Methyl Ketone
Chemical Formula (CH <sub>2</sub> )	2CHCH <sub>2</sub> COCH <sub>3</sub> Molecular Weight 100.16
Physical State Liquid	Salubility (H <sub>2</sub> 0) 8oiling Paint 116.2°C
Flash Point 73°FC.C	Vapor Pressure/Density 10 mm Freezing Point -84.° C
Specific Gravity .806	@20°C Odor/Odor Threshold .47 ppm Flammable Limits 1.4%-7.5%
Biological Properties:	
TLV-TWA 100 ppm	PEL Odor Characteristic Pleasant; Ketonic
IDLH	Human TCL <sub>O</sub> 25 ppm Aquatic - Rat/Mouse LD <sub>50</sub> 1120 m
Route of Exposure	50
Carcinogen	Teratogen Mutagen  Mutagen  Mutagen
Handling Recommendation Impermeable clothe	Mutagen  ms: (Personal protective measures)  s, gloves, boots; eye protection (face shields);
Handling Recommendation Impermeable clothe	Mutagen
Handling Recommendation Impermeable clothe respirators with o	Mutagen  Mutagen  Mutagen  Serious: (Personal protective measures)  Serious, boots; eye protection (face shields);  rganic vapor cartridges at .47 ppm; SCBAs at 100 ppm.
Handling Recommendation Impermeable clothe respirators with o	Mutagen  Mutagen  Mutagen  Serious: (Personal protective measures)  Serious, boots; eye protection (face shields);  rganic vapor cartridges at .47 ppm; SCBAs at 100 ppm.
Handling Recommendation Impermeable clothe respirators with o	Mutagen  Mutagen  Mutagen  Serious: (Personal protective measures)  Serious, boots; eye protection (face shields);  rganic vapor cartridges at .47 ppm; SCBAs at 100 ppm.
Handling Recommendation Impermeable clothe	Mutagen  Mutagen  Mutagen  Serious: (Personal protective measures)  Serious, boots; eye protection (face shields);  rganic vapor cartridges at .47 ppm; SCBAs at 100 ppm.
Handling Recommendation Impermeable clothe respirators with o	Mutagen  ns: (Personal protective measures) s, gloves, boots; eye protection (face shields); rganic vapor cartridges at .47 ppm; SCBAs at 100 ppm.
Handling Recommendation Impermeable clothe respirators with o	Mutagen  ns: (Personal protective measures) s, gloves, boots; eye protection (face shields); rganic vapor cartridges at .47 ppm; SCBAs at 100 ppm.
Handling Recommendation Impermeable clothe respirators with o	Mutagen  ns: (Personal protective measures) s, gloves, boots; eye protection (face shields); rganic vapor cartridges at .47 ppm; SCBAs at 100 ppm.
Handling Recommendation Impermeable clothe respirators with o	Mutagen  ns: (Personal protective measures) s, gloves, boots; eye protection (face shields); rganic vapor cartridges at .47 ppm; SCBAs at 100 ppm.
Handling Recommendation Impermeable clothe respirators with o Monitoring Recommendat  Disposal/Waste Treatment	Teratogen Mutagen  ns: (Personal protective measures) s, gloves, boots; eye protection (face shields); rganic vapor cartridges at .47 ppm; SCBAs at 100 ppm.  nons:
Handling Recommendation Impermeable clothe respirators with o  Monitoring Recommendat  Disposal/Waste Treatment	Teratogen Mutagen  s: (Personal protective measures) s, gloves, boots; eye protection (face shields); rganic vapor cartridges at .47 ppm; SCBAs at 100 ppm.  ions:  ht:
Handling Recommendation Impermeable clothe respirators with o Monitoring Recommendat  Disposal/Waste Treatment Health Hazards and Fir Inhalation: remove	Teratogen:  Mutagen  S: (Personal protective measures)  S, gloves, boots; eye protection (face shields);  rganic vapor cartridges at .47 ppm; SCBAs at 100 ppm.   ions:  at Aid:  to fresh air; artificial respiration if needed
Handling Recommendation Impermeable clothe respirators with o  Monitoring Recommendat  Disposal/Waste Treatment  Health Hazards and Fir Inhalation: remove Skin or Eyes: wash	Teratogen Mutagen  s: (Personal protective measures) s, gloves, boots; eye protection (face shields); rganic vapor cartridges at .47 ppm; SCBAs at 100 ppm.  ions:  ht:
Handling Recommendation Impermeable clothe respirators with o  Monitoring Recommendat  Disposal/Waste Treatment  Health Hazards and Fir Inhalation: remove Skin or Eyes: wash irritation stops.	Teratogen Mutagen  ms: (Personal protective measures) s, gloves, boots; eye protection (face shields); rganic vapor cartridges at .47 ppm; SCBAs at 100 ppm.  ions:  st Aid: to fresh air; artificial respiration if needed eyes thoroughly with water; wash skin with water until
Handling Recommendation Impermeable clothe respirators with o  Monitoring Recommendat  Disposal/Waste Treatment  Health Hazards and Fir Inhalation: remove Skin or Eyes: wash irritation stops.	Teratogen:  Mutagen  S: (Personal protective measures)  S, gloves, boots; eye protection (face shields);  rganic vapor cartridges at .47 ppm; SCBAs at 100 ppm.   ions:  at Aid:  to fresh air; artificial respiration if needed
Handling Recommendation Impermeable clothe respirators with o  Monitoring Recommendat  Disposal/Waste Treatment  Health Hazards and Fir Inhalation: remove Skin or Eyes: wash irritation stops.  Symptoms: Acute: I	Teratogen Mutagen  ms: (Personal protective measures) s, gloves, boots; eye protection (face shields); rganic vapor cartridges at .47 ppm; SCBAs at 100 ppm.  ions:  st Aid: to fresh air; artificial respiration if needed eyes thoroughly with water; wash skin with water until
Handling Recommendation Impermeable clothe respirators with o  Monitoring Recommendat  Disposal/Waste Treatment  Health Hazards and Fir Inhalation: remove Skin or Eyes: wash irritation stops.	Teratogen Mutagen  ms: (Personal protective measures) s, gloves, boots; eye protection (face shields); rganic vapor cartridges at .47 ppm; SCBAs at 100 ppm.  ions:  st Aid: to fresh air; artificial respiration if needed eyes thoroughly with water; wash skin with water until

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## HAZARD EVALUATION OF CHEMICALS

CREEKER NAME KANA	sene Date
	•
	Job No.
References Consulted	(circle):
NIOSH/OSHA Pocket Gu	side Verschueren Merck Index Hazardline Chris (Vol. II
oxic and Hazardous	
hemical Properties:	(Synonyms: Fuel Oil No. 1, Illuminating Oil, Kerosine, Jet
Chemical Formula C <sub>n</sub> i	
Physical State <u>Liq</u>	uid Solubility (H <sub>2</sub> 0) - Bailing Point 200-260° C
Flash Point 100°F	Vapor Pressure/Density Freezing Point -45.6°C
Specific Gravity .8	30 @ 15°C Odor/Odor Threshold 1 ppm Flammable Limits0.7%-5%
Incompetabilities _	
Biological Propertie	<u>::</u> : 3
TLV-TWA 200 ppm/10	00 mg/m <sup>3</sup> PEL Odor Characteristic Fuel Oil
IDLH	Human LDL 1176mg/kgMquatic2990 ppm/24hrRat/Mouse 800 mg/k
Route of Exposure <u>I</u>	nhalation, ingestion, direct contact
Carcinogen	Mutagen
	tions: (Personal protective measures)
Impermeable clot	tions: (Personal protective measures) thing, gloves, boots; eye protection (face shields); organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.
Impermeable clot	thing, gloves, boots; eye protection (face shields);
Impermeable clot respirators with	thing, gloves, boots; eye protection (face shields); n organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.
Impermeable clot respirators with	thing, gloves, boots; eye protection (face shields); n organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.
Impermeable clot	thing, gloves, boots; eye protection (face shields); n organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.
Impermeable clot respirators with	thing, gloves, boots; eye protection (face shields); n organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.
Impermeable clot respirators with Monitoring Recommend	thing, gloves, boots; eye protection (face shields); n organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.  detions:
Impermeable clot respirators with Monitoring Recommend	thing, gloves, boots; eye protection (face shields); n organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.  detions:
Impermeable clot respirators with	thing, gloves, boots; eye protection (face shields); n organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.  detions:
Impermeable clot respirators with Monitoring Recommend	thing, gloves, boots; eye protection (face shields); n organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.  detions:
Impermeable clot respirators with Monitoring Recommend Disposal/Waste Treat Health Hazards and F	thing, gloves, boots; eye protection (face shields); n organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.  detions:  tment:
Impermeable clot respirators with Monitoring Recommend Disposal/Waste Treat Health Hazards and F Aspiration: give	thing, gloves, boots; eye protection (face shields); n organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.  detions:  tment: e oxygen, Ingestion: do not induce vomiting, Eyes: wash with
Impermeable clot respirators with Monitoring Recommend Disposal/Waste Treat Health Hazards and F Aspiration: give	thing, gloves, boots; eye protection (face shields); n organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.  detions:  tment:
Impermeable clot respirators with Monitoring Recommend Disposal/Waste Treat Health Hazards and F Aspiration: give	thing, gloves, boots; eye protection (face shields); n organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.  detions:  tment: e oxygen, Ingestion: do not induce vomiting, Eyes: wash with
Impermeable clot respirators with Monitoring Recommend Disposal/Waste Treat Health Hazards and F Aspiration: give plenty of water,	thing, gloves, boots; eye protection (face shields); n organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.  detions:  tment: e oxygen, Ingestion: do not induce vomiting, Eyes: wash with
Impermeable clot respirators with Monitoring Recommend Disposal/Waste Treat Health Hazards and F Aspiration: give plenty of water,	thing, gloves, boots; eye protection (face shields); n organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.  detions:  tment:  first Aid: e oxygen, Ingestion: do not induce vomiting, Eyes: wash with Skin: wipe off and wash with plenty of soap and water  Irritating to skin and eyes; harmful if swallowed; cought
Impermeable clot respirators with Monitoring Recommend Disposal/Waste Treat Health Hazards and F Aspiration: give plenty of water,	thing, gloves, boots; eye protection (face shields); n organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.  detions:  tment:  first Aid: e oxygen, Ingestion: do not induce vomiting, Eyes: wash with Skin: wipe off and wash with plenty of soap and water  Irritating to skin and eyes; harmful if swallowed; coughing.
Impermeable clot respirators with Monitoring Recommend Disposal/Waste Treat Health Hazards and F Aspiration: give plenty of water, Symptoms: Acute:	thing, gloves, boots; eye protection (face shields); n organic vapor cartridges at 1 ppm; SCBAs at 200 ppm.  detions:  tment:  first Aid: e oxygen, Ingestion: do not induce vomiting, Eyes: wash with Skin: wipe off and wash with plenty of soap and water  Irritating to skin and eyes; harmful if swallowed; cought

(12/83,OLD)

Chemical Name: Acetone	
Date: 4/01/85	
CAS Number: 67-64-1	
REFERENCES CONSULTED: NIOSH/OSHA Pocket Guide,	Chris (Vol. II)
CHEMICAL PROPERTIES: (Synonyms: Dimethy ketor	ne, 2-propenone)
Chemical Formula: (CH <sub>3</sub> ) <sub>2</sub> CO	Vapor Pressure/Density: 400 mm/2.0
Molecular Weight: 58.08	Freezing Point:94.6°C
Physical State: <u>Liquid</u>	Specific Gravity: 0.797
Solubility (H <sub>2</sub> 0): <u>Miscible</u>	Odor/Odor Threshold: 100 ppm
Bailing Paint: 56.5°C	Flammable Limits: 12.8%, 2.6%
Flash Point: 4°F (0°C)	Incompatabilities: Strong oxidizers, acids
BIOLOGICAL PROPERTIES:	
TLV-TWA: 750 ppm (1780 mg/m <sup>3</sup>	PEL: 1000 ppm
Odor Characteristics: Fragrant; mint-like	IDLH: 20,000 ppm
Route of Exposure: <u>Inhalation</u> , inges-	Rat: LD <sub>50</sub> 9750 mg/kg
tion, direct contact	Human: TC <sub>LO</sub> -500 ppm
HANDLING RECOMMENDATIONS: (Personal protective	e measures)
Impermeable clothes, gloves, and boots; eye	
organic vapor cartridges at levels of 750 ppr	n; SCBAs at 20,000 ppm
HEALTH HAZARDS AND FIRST AID:	
Remove from exposure; perform artificial resp	piration if necessary; irrigate eyes with
water; wash skin with soap and water; if swa	llowed, induce vamiting
SYMPTOMS:	
Acute: Weakness; headaches; confusion; nause irritation; skin dryness; erythemia	ea; vomiting; narcosis; eye, nose, and throat
ATTACADON, SKAIN OF ANGSS! GENTLEMAS	<del></del>
Chronic: Dermatitis	

Chemical Name: Benzene			
Date: 3/29/85			
CAS Number: 71-43-2			
REFERENCES CONSULTED: NIOSH/OSHA Pocket Guide			
CHEMICAL PROPERTIES: (Synonyme: Benzol, cyclo	hexatriene, coal tar naptha)		
Chemical Formula: C <sub>6</sub> H <sub>6</sub>	Vapor Pressure/Density: 75 mm/2.8		
Molecular Weight: 78.08	Freezing Point: 42°F		
Physical State: Liquid	Specific Gravity: 0.877		
Solubility (H <sub>2</sub> 0): 820 ppm	Odor/Odor Threshold: 1.5 - 5 ppm		
Boiling Point: 176°F	Flammable Limits: 7.1%, 0.3%		
Flash Point: 12°F	Incompatabilities: Strong oxidizers,		
	zinc in presence of steam, chlorine tri-		
	fluoride, ozone, sulfuric acid, potas-		
	sium, chromic anhydride		
BIOLOGICAL PROPERTIES:			
TLY-TMA: 10 ppm	PEL: 1 ppm - 5 ppm ceiling		
Odor Characteristics: Aromatic	IDLH: 2000 ppm		
Route of Exposure: Inhalation, ingest-	Human: Carcinogen		
tion, direct contact, skin absorption	Rat/Mouse: Carcinogen		
HANDLING RECOMMENDATIONS: (Personal protective measures)			
Impermeable protective clothing, gloves, and boots; eye protection; respirator required			
st 1 ppm; SCBAs required at 10 ppm			
HEALTH HAZARDS AND FIRST AID:			
If in eyes, wash immediately with large amoun	If in eyes, wash immediately with large amounts of water; if on skin, wash with soap		
(mild detergent) and water; move person to f	resh air; perform artificial respiration if		
breathing stopped; if swallowed, do not induce vomiting, remove by gastric lavage and			
catherais			
SYMPTOMS:			
Acute: Excitation, euphoria, headache, drowsiness, dizziness, vomiting, delirium, un-			
consciousness, blurred vision, tremors, shallow respiration			
Chronic: Headache, anorexia, drowsiness, nervousness, pallor, anemia, bleeding under			
skin and eyes, reduced clotting ability, possibly leukemia, liver and kidney damage			
	and made and an entropy		

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Chemical Name: Chromium		
Date: 3/29/85  CAS Number: 7440-47-3		
LAS NUMBER: /44U-4/->		
REFERENCES CONSULTED: NIOSH/OSHA Pocket Guide		
CHEMICAL PROPERTIES: (Synonyme: Chrome, chrom	ium metal, ASTM 1481)	
Chemical Formula: Cr	Vapor Pressure/Density: 1 mm 3 1610°C	
Molecular Weight: 52	Freezing Point: 3452°F	
Physical State: Solid	Specific Gravity: 7.14	
Solubility (H <sub>Z</sub> O): <u>Insoluble</u>	Flammable Limits: Nonflammable	
Boiling Point: 4784°F	Incompatabilities: Nonflammable strong	
Flash Point: 752°F	oxidizers, acids, strong alkalies	
BIOLOGICAL PROPERTIES:  TLY-TWA: 0.5 mg/m <sup>3</sup>	Odor Characteristic: Odorless	
IDLH: 500 mg/m <sup>3</sup>	PEL: 1 mg/m <sup>3</sup>	
Carcinogen: Suspected in animals	Route of Exposure: Inhalation, ingestion	
Toppector III attingto	Timalacibit, Indescibit	
HANDLING RECOMMENDATIONS: (Personal protective measures)		
Skin: Wear impervious clothing, gloves, and	face shield. Inhalation: APR with appro-	
priate cartridges		
HEALTH HAZARDS AND FIRST AID:		
Eyes: Flush with large amounts of water. Skin contact: Wash with soap or mild deter-		
gent and water. Inhalation: Move person to fresh air and give artificial respiration if		
necessary. Ingestion: Large quantities of water and induce vomiting		
SYMPTOMS:		
Acute: Pulmonary/respiratory irritation, dizziness, vomiting		
Chronic: Cancer, broteimuria, hematuria, oliquria, anuria, uremia, shock		

Chemical Name: Xylene (0-Xylene)		
Date: 4/01/85		
CAS Number: 1330-20-7		
REFERENCES CONSULTED: NIOSH/OSHA Pocket Guide,	Chris (Vol. II)	
CHEMICAL PROPERTIES: (Synonyms: Xylol, dimeth	ylbenzene)	
Chemical Formula: C <sub>6</sub> H <sub>4</sub> (CH <sub>3</sub> ) <sub>2</sub>	Vapor Pressure/Density: 10 mm/3.66	
Molecular Weight: 106.2	Freezing Point:25.5°C	
Physical State: <u>Liquid</u>	Specific Gravity: 0.88	
Solubility (H <sub>2</sub> 0): 0.000003%	Oder/Oder Threshold: 0.05 ppm	
Boiling Point: 144.4°C	Flammable Limits: 6%, 1.0%	
Flesh Point: 90°F	Incompetabilities: Strong oxidizers	
BIOLOGICAL PROPERTIES:		
TLV-TMA: 100 ppm (435 mg/m <sup>3</sup> )	PEL: 100 ppm	
IOLH: 10,000 ppm	Rat: LD <sub>50</sub> 5000 mg/kg	
Route of Exposure: Inhelation, inges-	Aquatic: >100 mg/l	
tion, skin absorption, direct contact		
HANDLING RECOMMENDATIONS: (Personal protective measures)		
Impervious clothing, gloves, and boots; eye	protection; respirators with organic cart-	
ridges at levels of 100 ppm; SCBAs at 10,000 ppm		
HEALTH HAZARDS AND FIRST AID:		
Remove from exposure; perform artificial respiration if necessary; wash skin with soap		
and water; irrigate eyes with water; do not induce vomiting if swallowed, seek medical		
attention		
SYMPTOMS:		
Acute: Headache, dizziness severe coughing, pulmonary edema, skin dryness, excitement,		
incoordination, staggering gait, anorexia, nausea		
Chronic: Kidney and liver damage, decrease in red and white blood cell count (rever-		
sible), dermatitis		



Chemical Name: Toluene		
Date: 4/01/85		
CAS Number: 108-88-3		
REFERENCES CONSULTED: NIOSH/OSHA Pocket Guide,	Merck Index, Chris (Vol. II)	
CHEMICAL PROPERTIES: (Synonyms: Toluol, pheny	l methane, methyl benzene)	
Chemical Formula: C <sub>6</sub> H <sub>5</sub> CH <sub>3</sub>	Vapor Pressure/Density: 36.7 mm/3.14	
Molecular Weight: 92.13	Freezing Point:94.5°C	
Physical State: <u>Liquid</u>	Specific Gravity: 0.866	
Solubility (H <sub>2</sub> 0): 0.05%	Odor/Odor Threshold: 0.17 ppm	
Boiling Point:110.4°C	Flammable Limits: 7%, 1.27%	
Flash Point: 40°F	Incompatabilities: Strong oxidizers	
BIOLOGICAL PROPERTIES:		
TLV-TWA: 100 ppm (375 mg/m <sup>3</sup> )	PEL: 200 ppm	
Odor Cheracteristics: Aromatic	IDLH: 2000 ppm	
Route of Exposure: <u>Inhalation, skin</u>	Rat: LD <sub>50</sub> 4000 ppm	
absorption, ingestion, direct contact	Human: TCLO 200 ppm	
HANDLING PECOMMENDATIONS: (Personal protective measures)		
Impermeable clothing should be worn, including gloves and boots; eye protection; respira-		
tors with cartridges worn at levels of 100 pg	m; SCBAs at 2000 ppm	
HEALTH HAZARDS AND FIRST AID:		
Remove from exposure: administer artificial respiration if necessary; wash skin with soap		
and water; irrigate eyes with water; do not induce vomiting if swallowed, seek medical		
attention		
SYMPTOMS:		
Acute: Fatique, weakness, confusion, euphoria, dizziness, headache, insomnia, muscular		
fatique, dilated pupils, paresthesis of skin		
Chronic: Central nervous system depression, liver and kidney damage, dermatitis		



History and Overview of the Base; General Operations; and Site-Specific Descriptions.

## 1. History and Overview of the Base

Operations at Reese Air Force Base (RAFB) began in 1941. The base openned in June 1941 as Lubbock Army Airfield. The primary operation at that time was the Training of bomber, fighter and transport pilots during World War II. The end of the war brought the end of Lubbock Army Airfield in 1945.

The site was used for National Guard for training missions and for housing facilities for veterans and their families between 1945 and 1949. In 1949 the 3500th Pilot Training Wing moved to Lubbock from Barksdale AFB and the base was renamed for First Luitenant A. F. Reese. Since 1949 RAFB has continued to operate as a pilot training facility. RAFB is currently home for the 64th Flying Training Wing (ATC).

The following operations have resulted in the generation or processing of hazardous wastes:

- . Fuels management;
- . Waste solvent disposal;
- Fire protection training;
- . Aircraft maintenance;
- . Operation of general waste management facilities.

Waste handling at RAFB has included burial, incineration, wastewater treatment, and surface impoundment. For the purpose of this investigation, RAFB has been divided into nine sites. The nine sites include:

- . Site 1 Industrial Waste Lake (SI-1)
- . Site 2 Sewage Lake (SI-2), East Landfill (D-3), North Landfill (D-4), West Landfill (D-5), and Inactive Fire Training Area (FT-3).
- . Site 3 POL Storage Area (aqua system) Spill Site (SP-1)
- Site 4 Southwest Landfill (D-1)
- . Site 5 Civil Engineering Paint Shop Trench (SI-4)
- . Site 6 Active Fire Training Area (FT-1), Drainage Impoundment (SI-3).
- . Site 7 Northwest Landfill/Rubble Area (D-11)
- . Site 8 Hurlwood Acquisition and Landfill (D-7)
- Site 9 Sewage Digester Sludge Spreading Area (SS-1)

#### 2. General Operations

Sampling during this phase of the project will include groundwater, surface water, subsurface soils, and surface soils. E & E will install 4 monitoring wells and will make 31 soil borings. In addition, bottom sediment will be taken from the Industrial Waste Lake and the Sewage Lake.

Geophysical surveys will be performed prior to drilling to aid in the selection of safe boring locations. All borings will be monitored with the OVA or HNU during drilling to establish the level of respiratory protection required

All drilling operations will be conducted in Level C respiratory protection. Ambient air monitoring will be continuously performed using an HNU and an OVA. As dictated by the air monitoring, the level of respiratory protection may be changed. Upgrade/downgrade can be made according to the following guidelines:

- . Level D 0 PPM above background;
- . Level C anything above background to 5 PPM;

5 to 500 PPM above background, abandon site, re-evaluate and contact the Corporate Safety Director.

Air monitoring equipment will be chosen based on the type of contaminants expected and the weather conditions. The HNU has several different probes. E & E will use a probe that can photoionize the compound of interest.\*

Additionally, humid air quenches ions and decreases the instrument readings, making the HNU ineffective at relative humidities over 80%. The higher the EV of the detector probe lamp, the more sensitive the instrument is to humidity quenching. Cold weather can also affect the readings on the HNU, as condensation can settle inside the probe. The OVA will be substituted under such conditions.

## 3. Site-Specific Descriptions

3.1 Site 1 - Industrial Waste Lake (SI-1)

Since 1942 this surface impoundment has received storm drainage and industrial waste water. Currently, the Industrial Waste Lake receives surface runoff from most of the base area. This included drainage from the flightline and the industrial shops. This waste water routinely contains paint remover, drag-out from the plating tanks containing chromium, cadmium and acids, oil and grease from the parking apron, detergents, etc. A primary concern is paint stripper which contains methylene chloride; however, previous analyses of lake water samples have contained no methylene chloride.\*\*

- \* The initial survey should be made with the 10.2 EV probe. Although the 11.7 EV probe detects a greater variety of compounds, its' operating life is considerably less than that of the 10.2 EV.
- \*\* APRs with GMC-H cartridges do not provide protection from exposure to methylene chloride vapor. Therefore, during sampling on the lake, a drager pump and methylene chloride detector tubes will be used to monitor the breathing zone of site personnel. Any color changes will result in evacuation of the area. (The standard range of measurement of a methylene chloride drager tube is 100-2000 ppm. The TLV is 100 ppm.

Periodic water analyses indicate that the Industrial Waste Lake occasionally contained low concentrations of metals and volatile organic compounds. Bottom sediment and sludge samples contain several trace metals. However, E.P. Toxicity extractions indicate that these metals are in a relatively immobile form.

Four borings will be made around the periphery of the site. A magnetometer survey will be conducted prior to drilling. The borings will be located between areas D-4, D-5, FT-3, and the lake. Lake water and sediment samples will be collected from a jon-boat. All personnel will wear life vests and will be tethered to the boat. Also, safety lines will be attached to the samplers and held by personnel on shore. A rescue boat will be located at shore for use in an emergency. Level C protection will be used.

### 3.2.1 Sewage Lake (SI-2)

The sewage lake has held water since 1941, however, on several occasions the water was drained and on at least one occasion, the pond was poisoned with toxaphene to kill salamanders.

Sampling data indicate that the water quality is typical for a sewage lagoon. However, polynuclear aromatic hydrocarbons (PAH) have been detected in low concentrations. Historically, hazardous wastes have been disposed of in the Sewage Lake including: asphaltic debris from runway demolition, diesel oil, solvents, waste oils, and other industrial wastes from flightline shops.

Four borings will be made near the sewage lake. A magnetometer survey will be conducted prior to drilling. Lake water and sediment samples will be collected from a jon-boat. All personnel will wear life vests and will be tethered to the boat. Also safety lines will be attached to the samplers and held by personnel on shore. A rescue boat will be located on shore for use in an emergency. Level C respiratory protection will be used.

#### 3.2.2 East Landfill (D-3)

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During the 1940's open trenches located east of the Sewage Lake were used for waste disposal. Generally, these trenches ran north/south and contained construction/demolition lumber and miscellaneous trash. Most of the material was burned in the ditches, then covered over.

A magnitometer survey will be conducted to define landfill limits. Level C respiratory protection will be worn.

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## 3.2.3 North Landfill (D-4)

During the 1950's and 1960's, trenches on the north side of the Sewage Lake were used for waste disposal. Wastes included waste fuels, oils, construction debris, paint chips, and solvents.

A magnetometer survey will be conducted to define landfill limits. Level C protection will be worn.

## 3.2.4 West Landfill (D-5)

Several east/west trenches were reported to have existed on the west side of the Sewage Lake. The trenches were probably used for disposal of all types of base-generated wastes that could have included industrial compounds and waste oils.

A magnetometer survey will be conducted to define the landfill limits. Level C respiratory protection will be worn.

### 3.2.5 Inactive Fire Training Area (FT-3)

This area is adjacent to the Sewage Lake but its' specific location has not been identified. Typical fire training activities consisted of emptying fuel thinners and solvents on trash in an unlined pit. The fire would be started and then put out. The unburned fuels and extinguishing agents would then be allowed to evaporate, percolate, or runoff.

A magnetometer survey will be conducted to define the landfill limits.\*\*\* Level C respiratory protection will be worn.

## 3.3 POL Storage Area (aqua system) Spill Site (SP-1)

In about 1949, a major break occurred in an underground network of tanks and piping which carried aviation gas. An estimated 1000 gallons of aviation gas were lost. Remedial actions included pumping gas from a nearby well, contaminated soil excavation, pipe repairs, soil aeration, and backfilling.

A soil gas survey will be conducted using an OVA and O<sub>2</sub> meter/explosimeter to determine boring locations. Four borings will be made at designated locations. Level C respiratory protection will be used.

#### 3.4 Southwest Landfill (D-1)

This site is the only active landfill within the base proper. This site has had one or more disposal trenches at any given time since the mid-1950's. At present, only two trenches for disposal of construction type wastes are in use. However, in the past, domestic and hazardous wastes are also known to have disposed at this site. Wastes which were landfilled at this site include: waste acids, cleaning solutions, paint chips, drummed chromic acid, aircraft tire debris, lead pipe from aquasystem, ether, sludge from Industrial Waste Lake, plating tank bottom sludges containing cadmium, and pesticides.

Four soil borings will be made around the periphery of the site area. A magnetometer survey will be conducted to define the landfill limits prior to drilling.\*\*\* Level C respiratory protection will be used. APR with GMP cartridges will be worn.

\*\*\* If any drilling is conducted, the area will be monitored with an  $0_2/$  explosimeter for explosive atmospheres.

### 3.5 Civil Engineering Paint Shop Trench (SI-4)

A trench (8'  $\times$  10'  $\times$  5' deep) with a gravel French Drain was used to dispose of paint thinners and cleaners. For several years in the 1960's, kerosene, toluene, acetone, and lacquer thinner (methyl alcohol) were drained into the pit.

One monitoring well will be constructed on the periphery of the site. A magnetometer survey will be conducted prior to drilling. Area will be monitored with  $0_2$ /explosimeter to check for explosive atmospheres. Level C respiratory protection will be used.

### 3.6.1 Active Fire Training Area (FT-1)

The fires are started using waste fuel and other flammables from the base. Until the 1970's a major compound utilized in fighting fuel fires was carbon tetra chloride. Since the mid-1970's, bromochloromethane, and bromochlorodiflouromethane have been utilized. The fire fighting compounds as well as leaded aviation gas and JP-4 (often mixed with propanediol) can be expected to be contaminants at fire training areas.

Two borings will be made around the periphery of the site. A magnetometer survey will be conducted prior to drilling.

Level C respiratory protection will be used.

#### 3.6.2 Drainage Impoundment (SI-3)

This impoundment collect local runoff which includes surface drainage from a construction landfill, the southern end of runway A and the fire training area. Around the edges of the trench are deposits of ash-gray material.

Two surface soil samples will be collected from the site. Level C respiratory protection will be used.

### 3.7 Northwest Landfill/Rubble Area (D-11)

This site reportedly consists primarily of waste piles of asphaltic construction debris, resulting from runway demolition. However, early in the 1970's, thirty to fifty 55-gallon drums of material described as "too toxic for the landfill and lakes" were emptied into trenches cut into the construction debris.

Four borings will be made around the periphery of the site. A magnetometer survey will be conducted prior to drilling. Level C respiratory protection will be used.

## 3.8 Hurlwood Acquisition Area and Landfill (D-7)

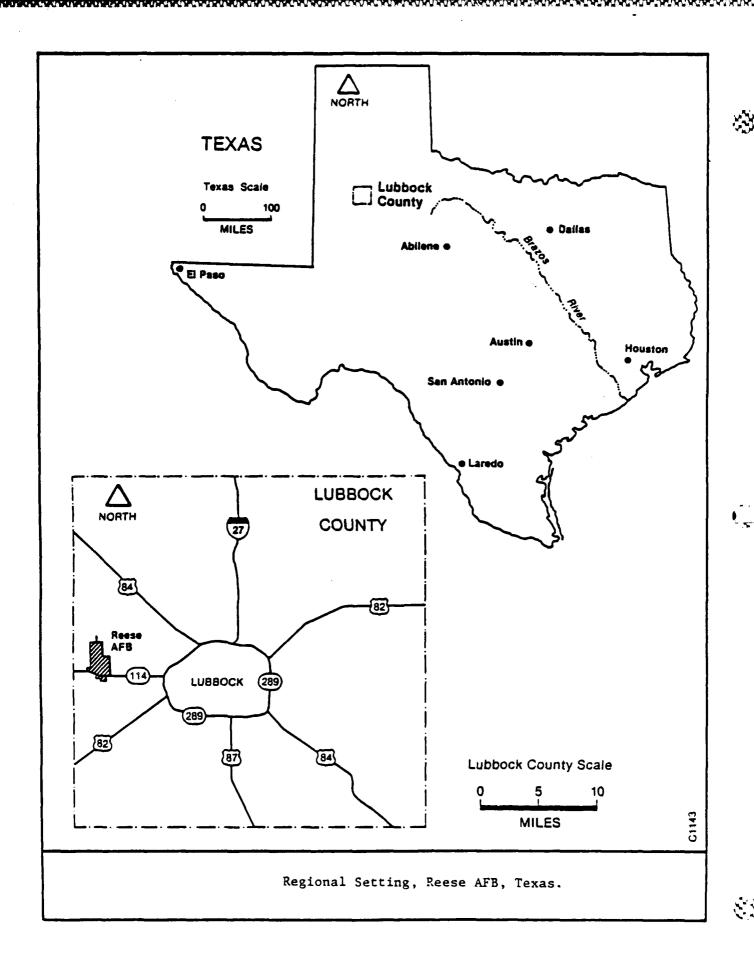
A disposal area existed behind a cotton gin that formerly occupied part of the property in Hurlwood acquired by the Air Force in 1978. The wastes disposed reportedly consisted of only non-hazardous debris including miscellaneous trash from the gin.

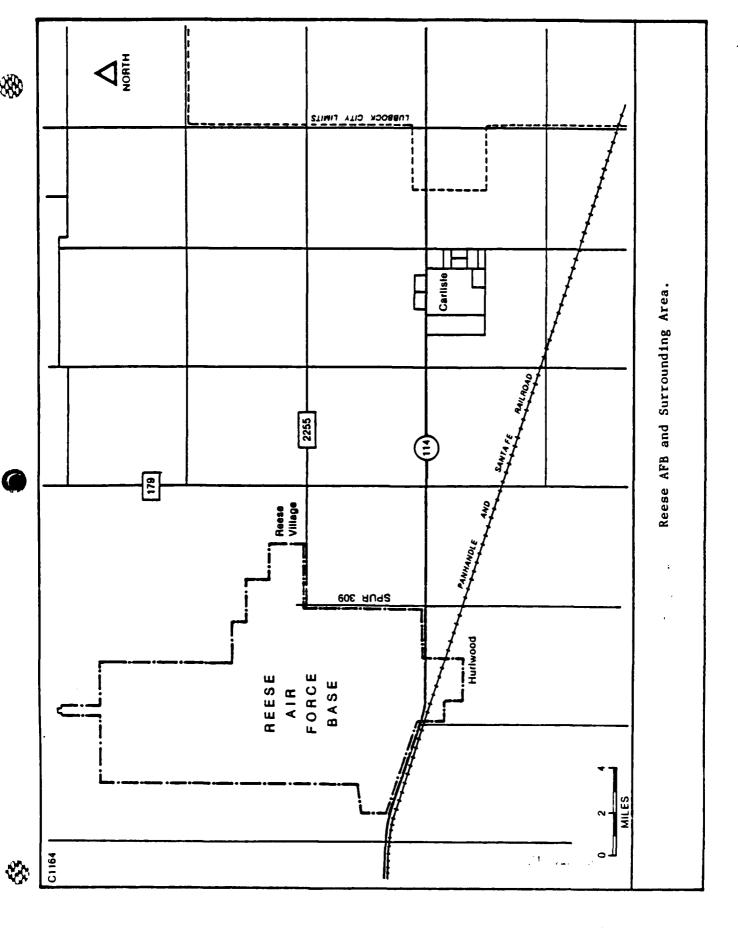
Two borings will be made around the periphery of the site. A magnetometer survey will be conducted prior to drilling to locate landfill limits and the presence of buried drums. Level C protection will be worn.

## 3.9 Sewage Digester Sludge Spreading Area (SS-1)

Currently, sludge is spread primarily along the perimeter road, the north bank of the Sewage Lake, and on the golf course greens. Analyses of sewage sludge indicate that polynuclear aromatic hydrocarbons (PAH) are a minor constituent. However, at the levels detected, the PAH's do not constitute a health hazard. A potential concern, however, is the suggestion that at some time prior to 1976, mixing of chromic acid with sewage sludge was a procedure used for waste acid disposal.

Ten borings will be made between 1st and 2nd Streets. A magnetometer survey will be conducted prior to drilling. Level C respiratory protection will be used.





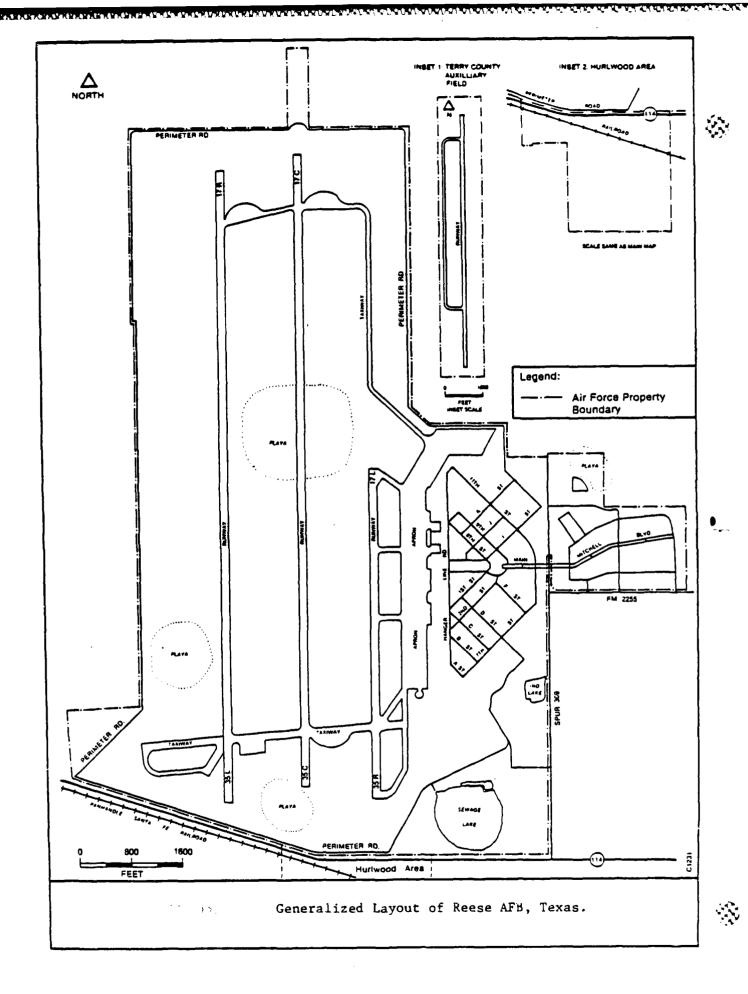


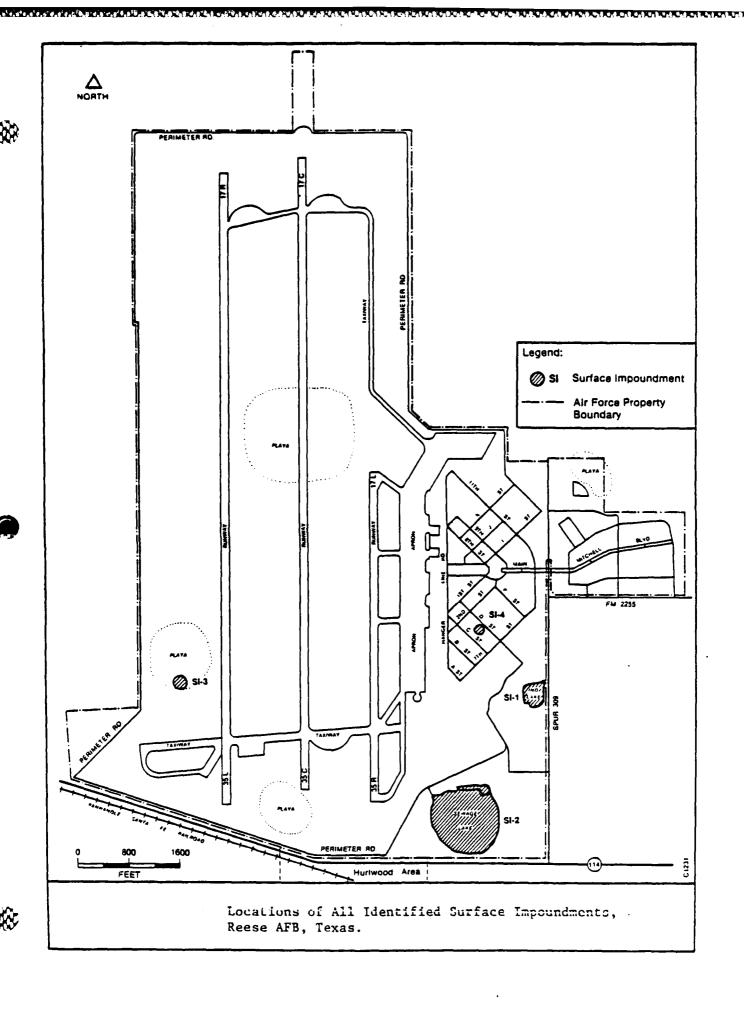


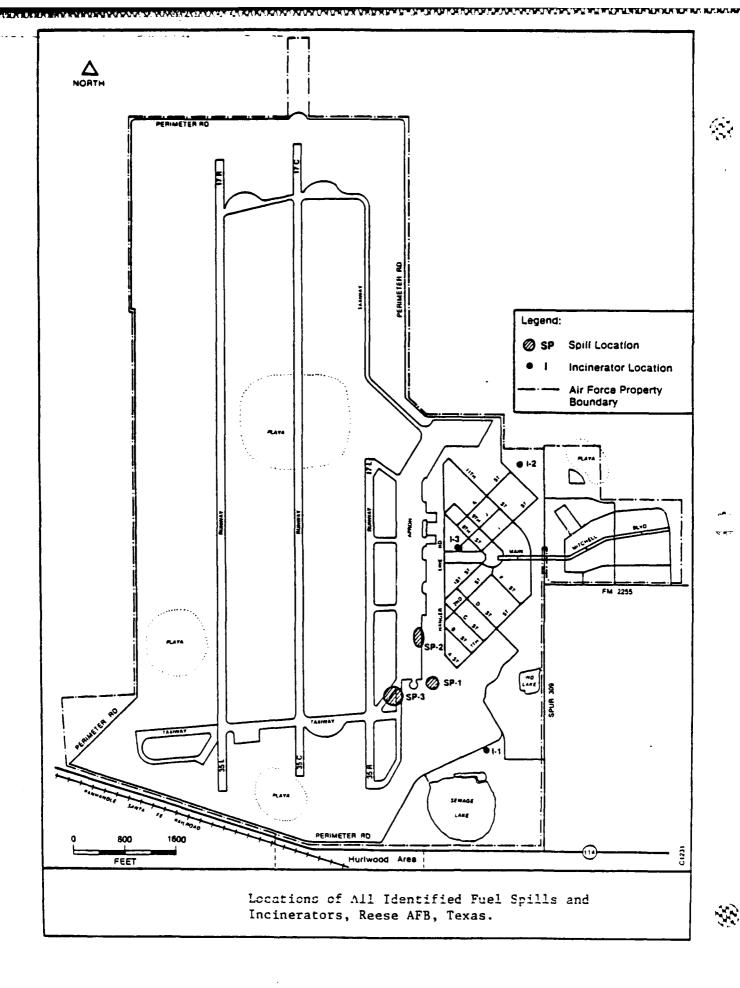


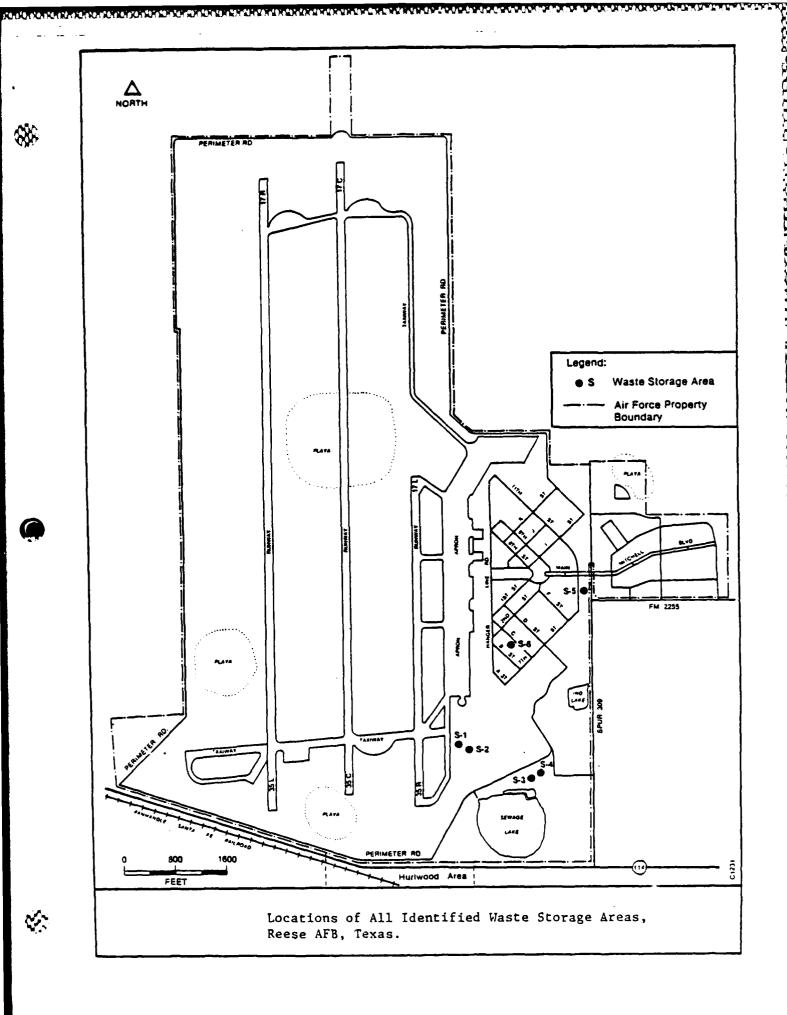


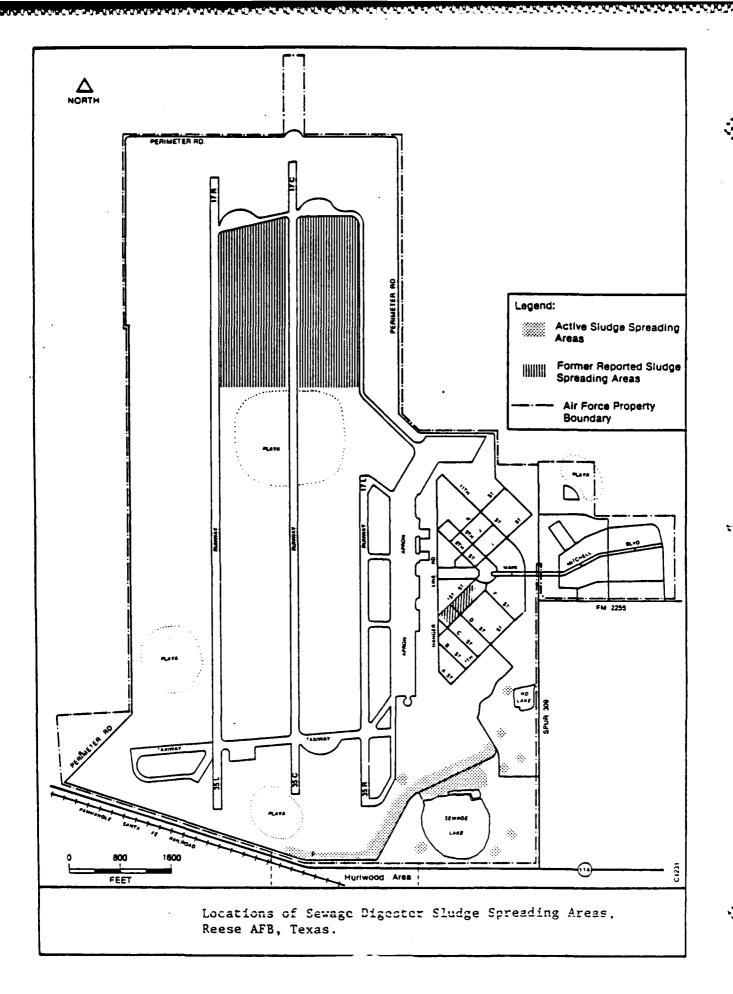


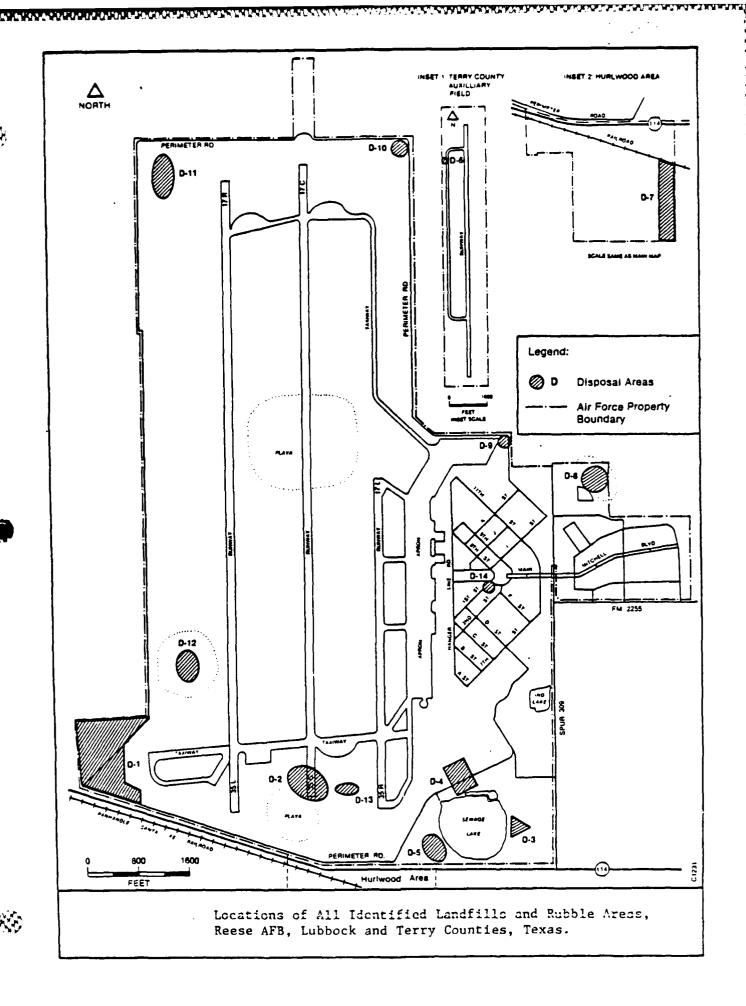


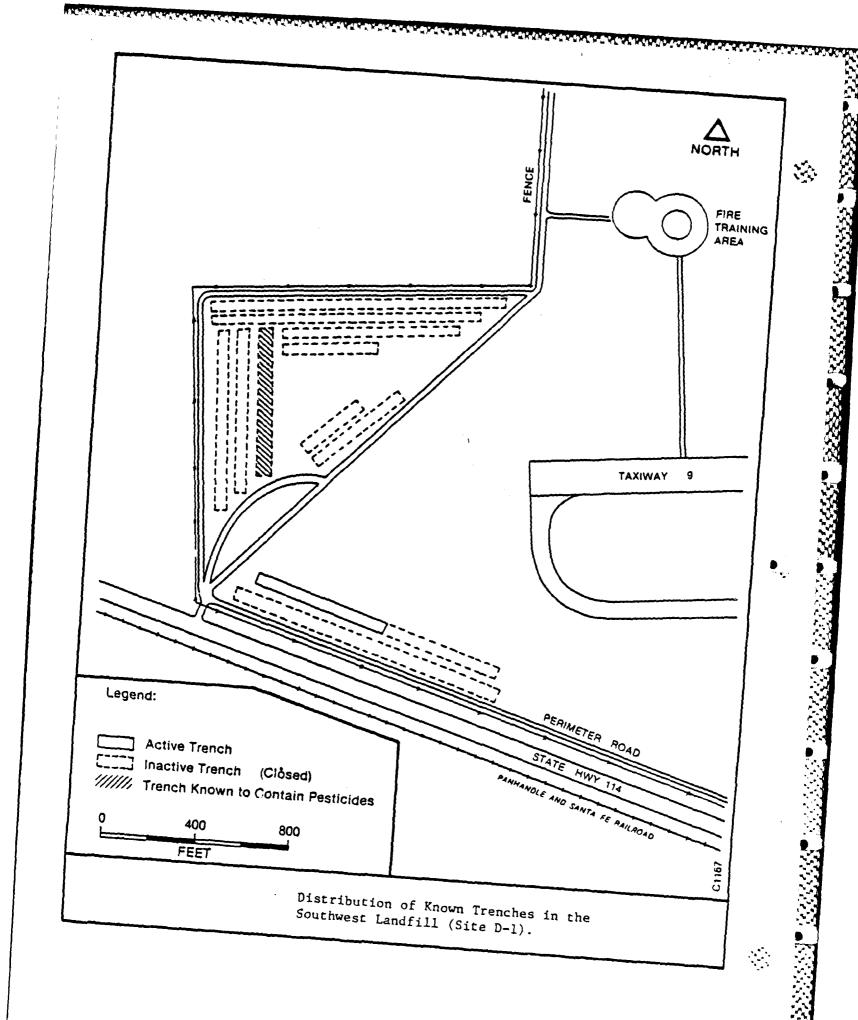


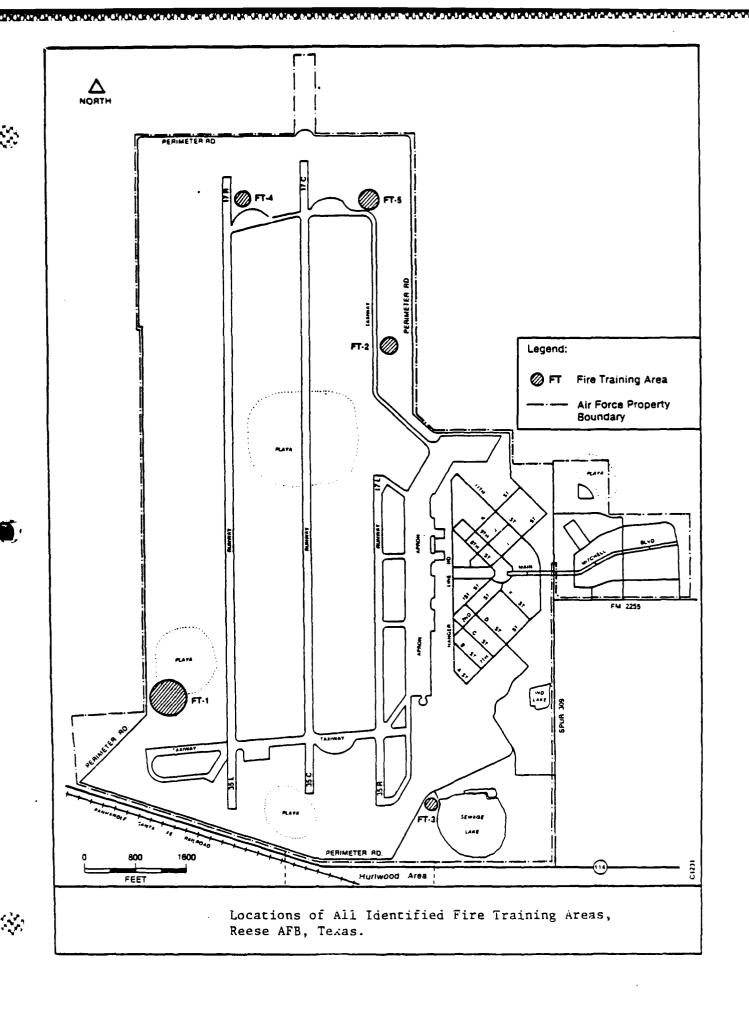


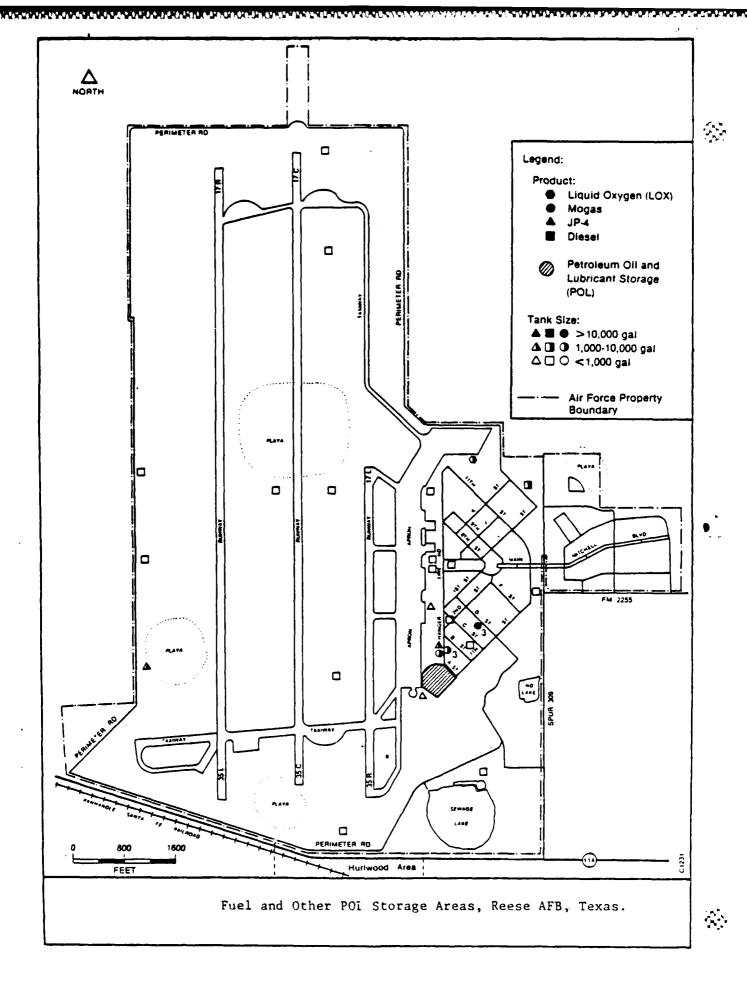












#### ATTACHMENT B

### ECOLOGY AND ENVIRONMENT, INC., STANDARD OPERATING PROCEDURES FOR EMERGENCIES DUE TO HEAT AND HEAT STRESS MONITORING

Field operations during the summer months can create a variety of hazards to the employee. Heat cramps, heat exhaustion, and heat stroke can be experienced and, if not remedied, can threaten life or health. Therefore, it is important that all employees be able to recognize symptoms of these conditions and be capable of arresting the problem as quickly as possible.

#### THE EFFECTS OF HEAT

As the result of normal oxidation processes within the body, a predictable amount of heat is generated. If the heat is liberated as it is formed, there is no change in body temperature. If the heat is liberated more rapidly, the body cools to a point at which the production of heat is accelerated and the excess is available to bring the body temperature back to normal.

Interference with the elimination of heat leads to its accumulation and thus to the elevation of body temperature. As a result, the person is said to have a fever. When such a condition exists, it produces a vicious cycle in which certain body processes speed up and generate additional heat. Then the body must eliminate not only the normal but also the additional quantities of heat.

Heat produced within the body is brought to the surface largely by the bloodstream and escapes to the cooler surroundings by conduction and radiation. If air movement or a breeze strikes the body, additional heat is lost by convection. However, when the temperature of the surrounding air becomes equal to or rises above that of the body, all of the heat must be lost by vaporization of the moisture or sweat from the skin surface. As the air becomes more humid (contains more moisture), vaporization from the skin slows down. Thus, on a day when the temperature is 95 to 100°F, with high humidity and little or no breeze, conditions are ideal for the retention of heat within the body. It is on such a day or, more commonly, a succession of such days (a heat wave) that medical emergencies due to heat are likely to occur. Such emergencies are classified in three categories: heat cramps, heat exhaustion, and heat stroke.

#### HEAT CRAMPS

Heat cramps usually affect people who work in hot environments and perspire a great deal. Loss of salt from the body causes very painful cramps of the leg and abdominal muscles. Heat cramps also may result from drinking iced water or other drinks either too quickly or in too large a quantity.

Heat Cramp Symptoms. The symptoms of heat cramp are:

- Muscle cramps in legs and abdomen,
- Pain accompanying the cramps,
- Faintness, and
- Profuse perspiration.

Heat Cramp Emergency Care. Remove the patient to a cool place. Give him sips of liquids such as "Gatorade" or its equivalent. Apply manual pressure to the cramped muscle. Remove the patient to a hospital if there is any indication of a more serious problem.

#### **HEAT EXHAUSTION**

Heat exhaustion occurs in individuals working in hot environments, and may be associated with heat cramps. Heat exhaustion is caused by the pooling of blood in the vessels of the skin. The heat is transported from the interior of the body to the surface by the blood. The blood vessels in the skin become dilated and a large amount of blood is pooled in the skin. This condition, plus the blood pooled in the lower extremities when an individual is in an upright position, may lead to an inadequate return of blood to the heart and eventually to physical collapse.

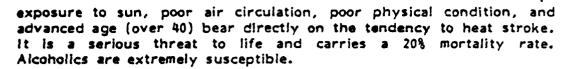
Heat Exhaustion Symptoms. The symptoms of heat exhaustion are:

- Weak pulse;
- Rapid and usually shallow breathing;
- Generalized weakness:
- · Pale, clammy skin;
- Profuse perspiration;
- Dizziness;
- Unconsciousness; and
- Appearance of having fainted (the patient responds to the same treatment administered in cases of fainting).

Heat Exhaustion Emergency Care. Remove the patient to a cool place and remove as much clothing as possible. Administer cool water, "Gatorade," or its equivalent. If possible, fan the patient continually to remove heat by convection, but do not allow chilling or overcooling. Treat the patient for shock, and remove him to a medical facility if there is any indication of a more serious problem.

#### HEAT STROKE

Heat stroke is a profound disturbance of the heat-regulating mechanism, associated with high fever and collapse. Sometimes this condition results in convulsions, unconsciousness, and even death. Direct



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#### Heat Stroke Symptoms. The symptoms of heat stroke are:

Sudden onset;

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- Dry, hot, and flushed skin;
- Dilated pupils;
- Early loss of consciousness;
- Full and fast pulse;
- Breathing deep at first, later shallow and even almost absent:
- Muscle twitching, growing into convulsions; and
- Body temperature reaching 105 to 106°F or higher.

Heat Stroke Emergency Care. Remember that this is a true emergency. Transportation to a medical facility should not be delayed. Remove the patient to a cool environment if possible, and remove as much clothing as possible. Assure an open airway. Reduce body temperature promptly—preferably by wrapping in a wet sheet or else by dousing the body with water. If cold packs are available, place them under the arms, around the neck, at the ankles, or at any place where blood vessels that lie close to the skin can be cooled. Protect the patient from injury during convulsions, especially from tongue biting.

#### AVOIDANCE OF HEAT-RELATED EMERGENCIES

Please note that, in the case of heat cramps or heat exhaustion, "Gatorade" or its equivalent is suggested as part of the treatment regime. The reason for this type of liquid refreshment is that such beverages will return much-needed electrolytes to the system. Without these electrolytes, body systems cannot function properly, thereby increasing the represented health hazard. Therefore, when personnel are working in situations where the ambient temperatures and humidity are high—and especially in situations where protection Levels A, B, and C are required—the site safety officer must:

- Assure that all employees drink plenty of fluids ("Gator-ade" or its equivalent);
- Assure that frequent breaks are scheduled so overheating does not occur; and
- Revise work schedules, when necessary, to take advantage of the cooler parts of the day (i.e., 5:00 a.m. to 1:00 p.m., and 6:00 p.m. to nightfall).

If protective clothing must be worn, especially Levels A and B, the suggested guidelines for ambient temperature and maximum wearing time per excursion are:

Ambient Temperature (°F)	Maximum Wearing Time per Excursion (Minutes)
Above 90	15
85 to 90	30
80 to 85	60
70 to 80	90
60 to 70	120
50 to 60	180

One method of measuring the effectiveness of employees' rest-recovery regime is by monitoring the heart rate. The "Brouha guideline" is one such method:

- During a three-minute period, count the pulse rate for the last 30 seconds of the first minute, the last 30 seconds of the second minute, and the last 30 seconds of the third minute.
- · Double the count.

If the recovery pulse rate during the last 30 seconds of the first minute is at 110 beats/minute or less and the deceleration between the first, second, and third minutes is at least 10 beats/minute, the work-recovery regime is acceptable. If the employee's rate is above that specified, a longer rest period is required, accompanied by an increased intake of fluids.

#### ATTACHMENT C

LEVEL O DECONTAMINATION

#### A. EQUIPMENT WORN

The full decontamination procedure outlined is for workers wearing Level C protection (with taped joints between gloves, boots, and suit) consisting of:

- One-piece, hooded, chemical-resistant solash suit.
- Canister equipped, full-face mask.
- Hard hat.
- Chemical-resistant, steel toe and shank boots.
- Boos covers.
- Inner and outer gloves.

#### S. PROCEDURE FOR FULL DECONTAMINATION

Station 1: Segregated Equipment Brop

Deposit equipment used on-sits (too's, sampling devices and containers, monitoring instruments, radios, olippeards, etc.) on plastic area along or in different containers with plastic liners. Each will be contained to a different degree. Segregation at the drop recuses the probability of cross-contamination.

Equipment: various size containers plastic liners plastic drop claths

Station 2: Soot Cover and Glove Wash

Scrub outer boot covers and gloves with decon solution or detergent/water.

Equipment: container (20-30 gallons)
depon splution
on
dependent water

2-3 long-hansle, soft-bristle scrub brushes

#### Station 3: Boot Cover and Glove Rinse

Rinse off decon solution from Station 2 using copious amounts of water. Repeat as many times as necessary.

Equipment: container (30-50 gallons)

or

high-pressure spray unit

water

2-3 long-handle, soft-bristle scrub brushes

#### Station 4: Tape Removal

Remove tape around boots and gloves and deposit in container with plastic liner.

Equipment: container (20-30 gallons)

plastic liners

#### Station 5: Boot Cover Removal

Remove boot covers and deposit in container with plastic liner.

Equipment: container (30-50 gallons)

plastic liners bench or stool

#### Station 6: Outer Glove Removal

Remove outer gloves and deposit in container with plastic liner.

Equipment: container (20-30 gallens)

plastic liners

#### Station 7: Suit/Safety Boot Wash

Thoroughly wash splash suit and safety boots. Scrub with long-handle, soft-bristle scrub brush and copious amounts of decon solution or detergent/water. Repeat as many times as necessary.

Equipment: container (30-50 gallons)

decon solution

or

detergent/water

2-3 long-handle, soft-bristle scrub brushes

#### Station 8: Suit/Safety Boot Rinse

Rinse off decom solution or detergent/water using coafous arounts of water. Repeat as many times as necessary.

Equipment: container (33-50 gallons)

high-pressure spray unit

water

2-3 long-handle, soft-bristle scrub brushes

#### Station 9: Canister or Mask Change

If worker leaves Exclusion Zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boots covers donned, and joints taped. Worker returns to duty.

Equipment: canister (or mask)

tape

boot covers gloves

Station 10: Safety Boot Removal

Remove safety boots and deposit in container with plastic liner.

Equipment: container (30-50 gailons)

plastic liners bench or stool boot jack

Station 11: Splash Suit Removal

With assistance of helper, remove splash suit. Deposit in container with plastic liner.

Equipment: container (30-50 gallons)

bench or stool clastic liner

Station 12: Inner Glove Wash

Wash inner gloves with decon solution or detergent/water that will not harm skin. Repeat as many times as necessary.

Equipment: decon solution

or

detergent/water basin or bucket

Station 13: Inner Glove Rinse

Rinse inner gloves with water. Pereat as many times as necessary.

Equipment: water

basin or bucket small table

#### Station 14: Facepiece Removal

Remove facepiece. Avoid touching face with gloves. Deposit facepiece in container with plastic liner.

Equipment: container (30-50 gallons)

plastic liners

Station 15: Inner Glove Removal

Remove inner gloves and deposit in container with plastic liner.

Equipment: container (20-30 gallons)

plastic liners

#### Station 16: Inner Clothing Removal

Remove clothing soaked with perspiration. Place in container with plastic liner. Do not wear inner clothing off-site since there is a possibility small amounts of contaminants might have been transferred in removing fully encapsulating suit.

Equipment: container (20-50 gallons)

plastic liners

#### Station 17: Field Wash

Shower if highly toxic, skin-corrosive or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available.

Equipment: water

soap tables

wash basins/buckets

field showers

#### Station 18: Redress

Put on clean clothes. A dressing trailer is needed in inclement weather.

Equipment: tables

chairs lockers clothes

#### C. FULL DECONTAMINATION (SIT. 1) AND THREE "COLFICATIONS

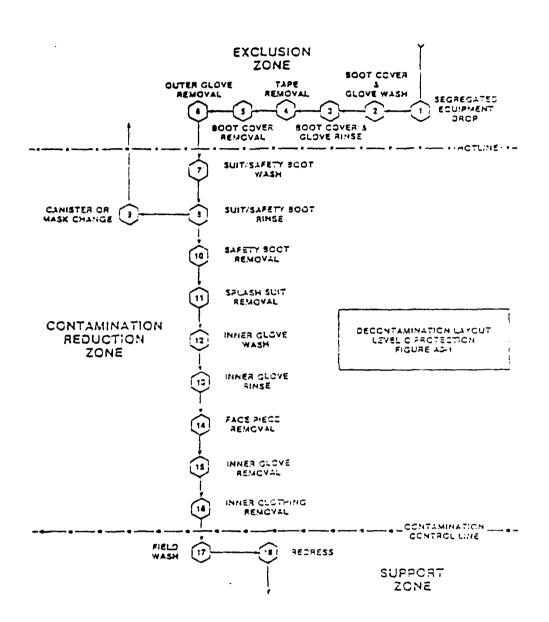
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Situation 1: The individual entering the Contamination Reduction Corridor is observed to be grossly contaminated or extremely skin-corrosive substances are known or suspected to be present.

Situation 2: Same as Situation 1 except individual needs new canister or mask and will return to Exclusion Zone.

Situation 3: Individual entering the CRC is expected to be minimally contaminated. Extremely skin-corrosive materials are not present. No outer gloves or boot covers are worn. Inner gloves are not contaminated.

Situation 4: Same as Situation 3 except individual needs new confister or mask and will neturn to Exclusion Ione.



# ATTACHMENT D Project Site Safety Forms

## HAZARDOUS & TOXIC MATERIALS TEAM SITE SAFETY REVIEW

GENERAL INFORMATION
DATETIMEJOB NO: DF-2000
SITE: Reese Air Force Base
LOCATION: Lubbock, Texas
ONSITE CLIENT CONTACT:
OBJECTIVES: Subsurface soil and water sampling, geophysical surveys
TYPES OF CHEMICALS ANTICIPATED: Solvents, metals, fuels, oils, pesticides
MEETING CONDUCTED 8Y:
TOPICS DISCUSSED
PHYSICAL HAZARDS: Heat. drilling accidents
CHENICAL MAZAROS: Fuels, solvents, heavy metals, oils, pesticides
PERSONAL PROTECTION: C/D
DECONTAMINATION: Soap and water wash/methanol, DI rinse
SPECIAL SITE CONSIDERATIONS: Large site size, complex logistics for fiel
work
CHECK LIST
1. Emergency information reviewed? and made familiar to all team members?
2. Route to nearest hospital driven a and its location known to all team
3. Site safety plan readily available and its location known to all team members?

## Complete prior to on-site work ON-SITE SAFETY MEETING Job No. DF-2000 Date Time Address Reese Air Force Base Specific Location Type of Work Subsurface soil and water sampling Geophysical surveys SAFETY TOPICS PRESENTED Protective Clothing/Equipment Levels C/D Chemical Hazards Fuels, solvents, heavy metals, oils, pesticides Physical Hazards Heat stress, drilling hazards Notify base medical facility for emergency treatment and transport to Emergency Procedures First aid/CPR/Water/Shade/Oxygen Hospital/Clinic Lubbock General Phone (806) 743-9911 Hospital Address 602 Indiana Special Equipment ATTENDEES Name Printed Signature

Meeting Conducted By: \_

Site Safety Officer

Name Printed

Signature

Team Leader

7/84 Revised DLD

### STATEMENT OF MEDICAL FITNESS

Must be completed prior to work starting

This is to confirm that the following e field activities at in con in con in con in con	mployees may be engaged in nection with the Subcon-
tract Agreement between E & E and	, dated,
19, and that all of said employees are med	
required field activities and to utilize res	piratory equipment in
accordance with 29 CFR, Part 1910 and "USEPA	Standard Operating Safety
Guides,* 1984.	
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	Authorized Subcontractor Representative

		DATE/ : Ma		
NAME:		SITE:		· · · · · · · · · · · · · · · · · · ·
COMPANY:		LOCATION:		
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Starting Time:		Pulse Rate:		beats/minute;
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	rest 60 sec.;	;	rest 60; _	ò/m.
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LRF/E&E/042584			Site Safet Contract 1	y Officer

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END DATE FILMED 7) 7/ C 9-88